Mining CONGRESS JOURNAL

MAY 1945

—Hamilton Wright Photo

3-CAR PACKAGED POWER

Car No. 1—all the a-c equipment
Car No. 2—the transformer
Car No. 3—the Ignitron Rectifier and the d-c equipment

THE AIR-COOLED TRANSFORMER IS

One

IMPORTANT REASON WHY

Two

OUT OF EVERY

Three

MINE OPERATORS CHOOSE

Westinghouse

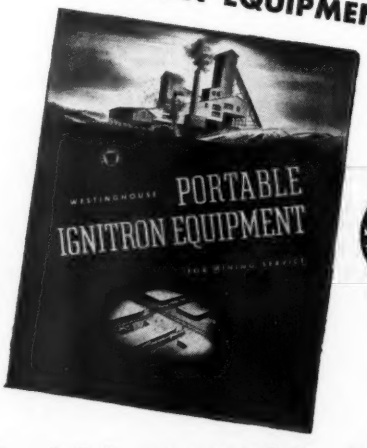
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

IGNITRON EQUIPMENT

Development of the Westinghouse Type ASL *Air-Cooled Transformer* was a major step forward in the safety of underground equipment. Since no cooling liquids are required, fire and explosion hazards are eliminated. This is one of the important reasons why two out of every three users of portable equipment choose the Westinghouse Ignitron Rectifier train.

Space is another important consideration. The Westinghouse Air-Cooled Transformer occupies less than two-thirds of the space required by a liquid-filled transformer. This makes it possible to provide a small, compact, three-car unit . . . light in weight and easy to handle.

Ignitron portable power units are now in use on all types of heavy-duty service in coal, iron, zinc, copper and salt mines. They are ideally suited for mining use. Dust, dirt, fumes, heat, dampness or condensation have no effect on the operation of the air-cooled transformer. For complete information about Ignitron Rectifier Equipment, call your nearest Westinghouse office. Or, send for booklet B-3492 illustrated below. Westinghouse Electric & Mfg. Co., P.O. Box 868, Pittsburgh 30, Pa. J-94668



This new booklet gives the full story of the portable Westinghouse Ignitron Rectifier. It contains the specifications of the four standard sizes built today—200, 300, 400 and 500 kw. Write today for your copy.

ELECTRICAL EQUIPMENT FOR THE MINING INDUSTRY

Mining Congress Journal

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FRONT COVER: The Mercer County Vocational School at Bluefield, W. Va., conducts a complete course in the A-B-C's of Bituminous Coal Mining for youngsters 14 to 18—mostly sons of bituminous coal miners.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress.

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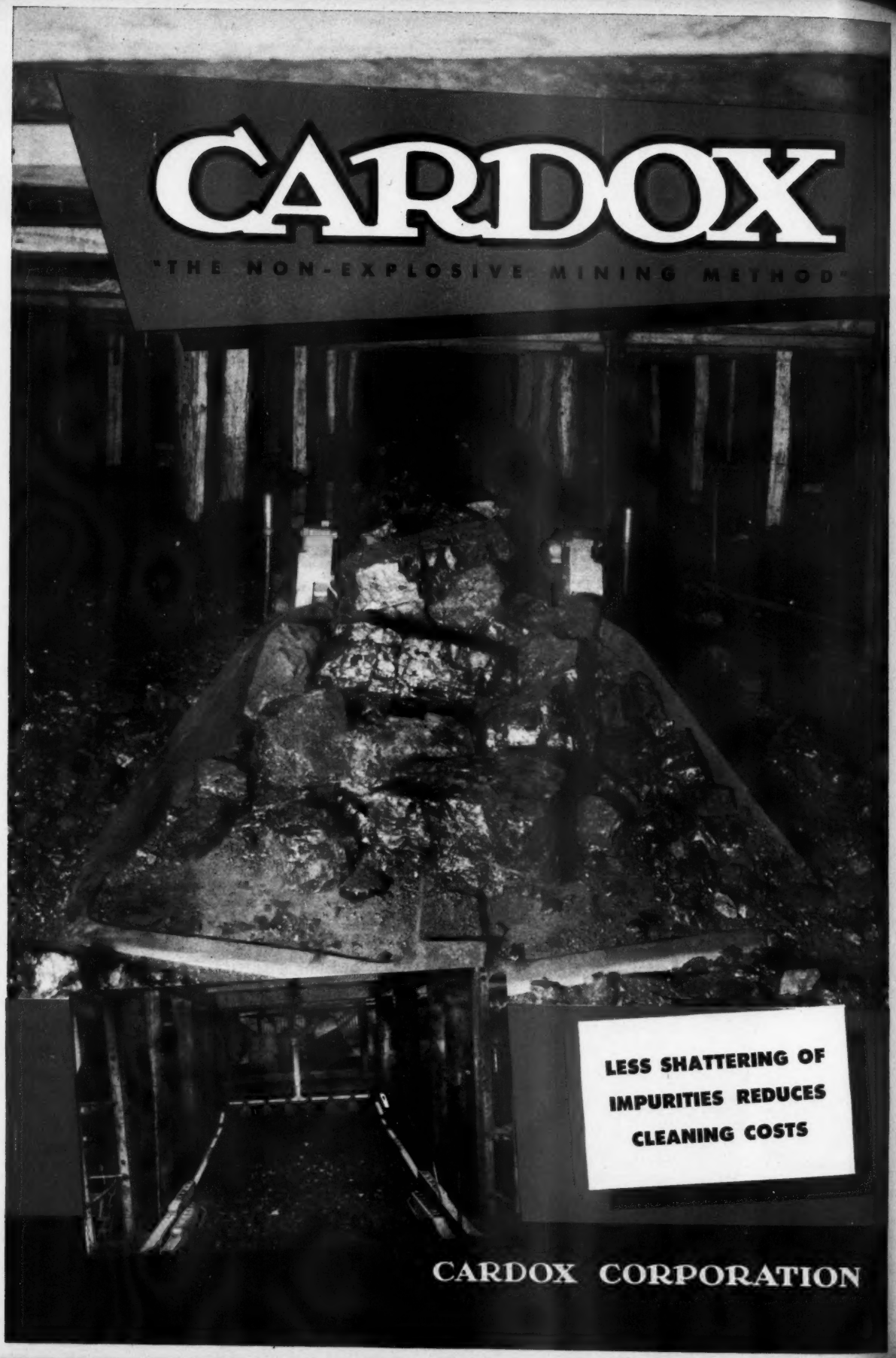

CARDOX
"THE NON-EXPLOSIVE MINING METHOD"
LESS SHATTERING OF IMPURITIES REDUCES CLEANING COSTS
CARDOX CORPORATION

for GREATER REALIZATION

Cardox increases realization, especially in fully mechanized mines. Its distinctive slow spreading and shearing action breaks the face along its natural lines of cleavage, rolls the coal forward for quick, easy loading, and largely eliminates shatter-cracks.

Cardox mined coal does not crumble even though subjected to extensive mechanical handling. Consequently it is more economical to clean. In many mines a substantial percentage of impurities are kept so large that they can be picked out at the face by hand . . . making it unnecessary to haul them to the surface.

Other Cardox advantages in mechanized mines include (1) the use of longer cutter bars and more coal per face for the loading machine, (2) reduction of roof and rib failures, (3) elimination of work-retarding smoke and noxious fumes, (4) less wear and tear on loaders.

Write for details of free demonstration of these CARDOX advantages . . . right in your mine.

ROLLS COAL FORWARD FOR EASIER LOADING

FIRMER COAL STRUCTURE WITHSTANDS MECHANICAL HANDLING

CARDOX
Hardsocg Drilling Equipment
Complete Line of Drilling Equipment designed to give you the maximum in drilling efficiency.

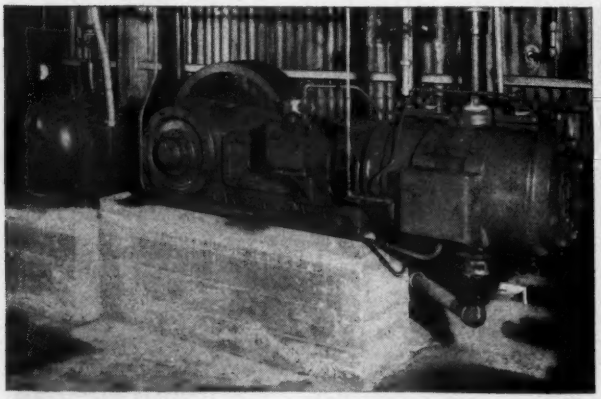
BELL BUILDING • CHICAGO 1, ILLINOIS

Give 'em Air TO UP TONNAGES

Back up your man power with plenty of air-power! Gardner-Denver "RX" and "HA" Horizontal Water-Cooled Air Compressors assure an ever-ready source of compressed air for every mining need.

These dependable compressors have the capacity to deliver plenty of air . . . at remarkably low horsepower requirements. Ruggedly built, with vital parts cast in GarDurloy and Timken main bearings, they keep air "on tap" . . . all the time.

For complete information, write for illustrated bulletins. Gardner-Denver Company, Quincy, Illinois.



• Gardner-Denver "RX" Horizontal Single Stage Compressor. Capacities range from 89 to 1292 cubic-feet displacement per minute.

• Gardner-Denver "HA" Horizontal Two Stage Compressor. Capacities range from 316 to 2012 cubic-feet displacement per minute.

NOTE THESE *"Plus"* FEATURES

- Extra large water jackets assure a cooler-running compressor for higher efficiency and lubrication economies.
- Unrestricted air passages and large valve and port areas mean greater overall efficiency.
- Air output is under constant automatic control.
- Air-cushioned Duo-plate valves are quiet in operation . . . seldom require attention.

GARDNER-DENVER *Since 1859*

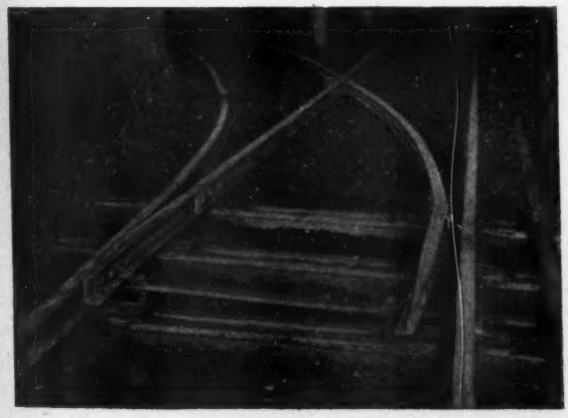
HERE'S A *three-point program* FOR CUTTING COSTS— FOR BOOSTING PRODUCTION

USE PRESSURE-TREATED MINE TIMBERS

Pressure-treatment greatly extends the useful life of timbers, saves labor, material and delays. One user reported an annual saving of over $2.00 per set from his creosoted timbering and estimated it would last the life of the heading.

USE PRESSURE-CREOSOTED MAIN-HAULAGE TIES

In a mine where the expected life of untreated ties is 3½ years, these pressure-creosoted ties have just been *reinstalled* in a main haulway after 14 years of continuous main-haulage service.



USE AR-MOORED* TIES FOR WORKING SECTIONS

These ties can be repeatedly lifted and re-used as sections are worked out, without bending, distortion or spike-kill. One mine estimates an annual saving per tie of over 32 cents . . . in addition to the savings in elimination of track delays.

We will be glad to furnish information on any or all of these production and profit builders.

KOPPERS COMPANY, INC. • WOOD PRESERVING DIVISION

PITTSBURGH 19, PA.

KOPPERS

Buy War Bonds— and Keep Them!

*Trade Mark

THE INDUSTRY THAT SERVES ALL INDUSTRY

Westinghouse Introduces

The new Westinghouse "DUAL-DUTY" mine locomotive performs all tractive service from the face to the main haulage siding.

When the locomotive is operating behind the loading machine from reel, low speed is necessary due to the short length of each movement, and because it is operating on temporary tracks. Under this condition, the motors operate at maximum field strength to develop maximum tractive effort at low speed, and with minimum power consumption.

When operating from trolley on more permanent tracks, in secondary haulage service, the motor fields' strength may be changed to obtain an increase in speed of approximately 40%, thus enabling the locomotive to make the longer movements at an economical speed.

For the first time, a locomotive has been developed which will do both of these jobs efficiently. Selection of speeds is provided by extra controller "points".

Call your nearest Westinghouse office for full details—or write Westinghouse Elec. & Manufacturing Co., P. O. Box 868, Pittsburgh 30, Pa. J-15098

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

THE "DUAL-DUTY" MINE LOCOMOTIVE

low speed for gathering

high speed for secondary haulage

Prior to the introduction of Westinghouse "DUAL-DUTY" mine locomotives, the industry had to choose between four types of equipment:

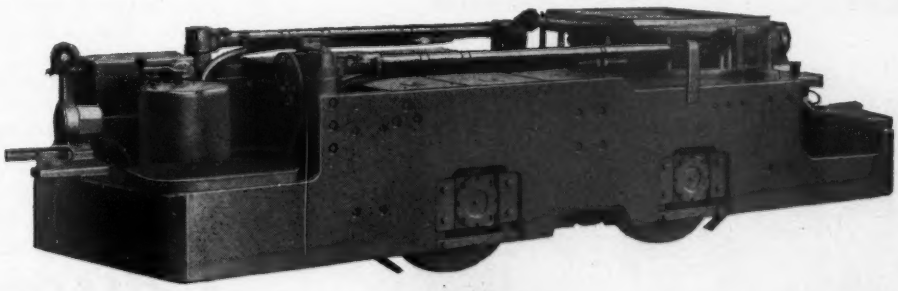
1. Entirely different locomotives, with entirely different speeds, for gathering and swing service.
2. Series parallel connections, to obtain different operating speeds.
3. High-speed locomotives, operating on points when used in gathering service.
4. Low-speed locomotive designed primarily for gathering, but too slow for efficient secondary haulage.

The new Westinghouse "DUAL-DUTY" mine locomotive eliminates all of the recognized disadvantages of the four old systems.

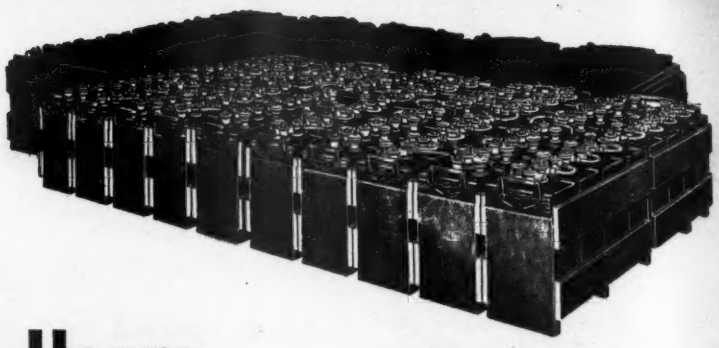
The "DUAL-DUTY" locomotive with its motors always connected in parallel has smoother operating characteristics and hauls heavier loads—operates equally efficient at high or low speeds, with minimum power demand. *It's another Westinghouse "first" for mechanized mines.*

OTHER WESTINGHOUSE MINE LOCOMOTIVE "FIRSTS"

- Breather—to eliminate formation of destructive acids inside explosion-tested control compartments.
- Parallel Reversing Controller—for simplified control of locomotive in following loaders.
- Cam Type Controller—replaced sliding contact controls with high capacity cam switches.
- Lever Hand Brake—eliminated bothersome hand wheel braking.
- Gathering Reel for Top Inspection—made motor commutator, slip ring and all brushholders easily accessible through openings on the top of the motor frame.
- Easy Journal Bearing Adjustment—by use of journal boxes that may be removed without untrucking locomotive.



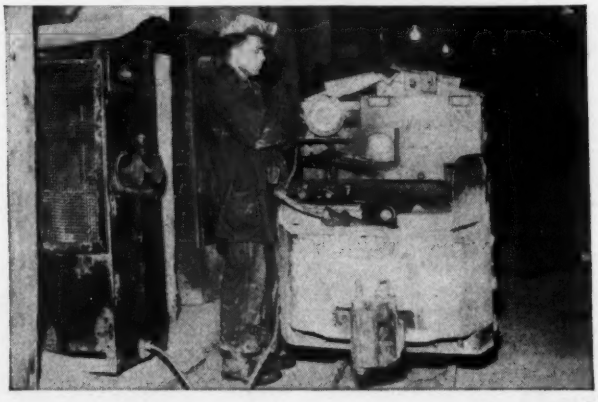
MINE LOCOMOTIVES



Lives a DOUBLE LIFE ...For Many Users

In Mine Locomotives and Shuttle Cars Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- They are **simple and easy to maintain.**
- They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They can **stand idle indefinitely** without injury, without attention, and without expense.

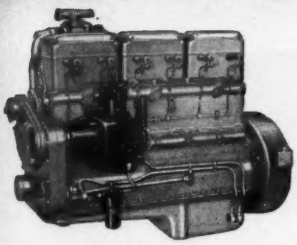


An indication of the unequaled dependability of Edison Alkaline Batteries in mine haulage services is the fact that many users are getting a "second life" from them. After delivering normal service life in locomotives and shuttle cars, alkaline batteries are often regrouped and re-applied to various kinds of lighter-duty work for which their capacity is still adequate. In these "new" applications such as signals, alarms, switch controls and emergency lighting, the batteries give more years of dependable service.

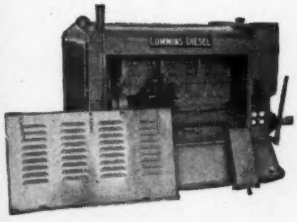
More and more operators are getting this extra battery life, especially with war-created scarcities and the need to conserve. Thus in effect they are getting new batteries *free.* Yet they could not afford to entrust "worn-out" haulage batteries with other equally important, though lighter, loads if they had not already discovered that alkaline batteries remain dependable power units beyond their normal service life. The fact they do live this "double life" is your assurance of getting the nearest approach to failure-free haulage power it is possible to obtain, when locomotives and shuttle cars are equipped with alkaline batteries.

The reasons are few and simple: steel cell construction; an alkaline electrolyte that is a natural preservative of steel; a principle of operation free from self-destructive reactions. Because of their long life and other advantages, alkaline batteries help cut haulage costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.*

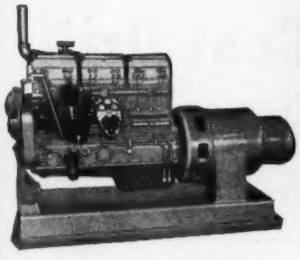
Edison
ALKALINE BATTERIES



The six-cylinder, 150 hp. Model HBI-600 Cummins Diesel is a portable industrial version of the Model H engine . . . the *original* high speed diesel. It is designed for heavy-duty shovels, cranes and numerous other types of wheel and track mounted dirt moving or material handling equipment in the construction and aggregates fields.



Model HP-600 Cummins Diesel is an enclosed power unit and is the same engine, basically, as the Model HBI-600, having the same horsepower rating. Like all Cummins Diesels, this model has earned acceptance among contractors and aggregates producers by its economy, quick cold-weather starting and its rugged dependability.

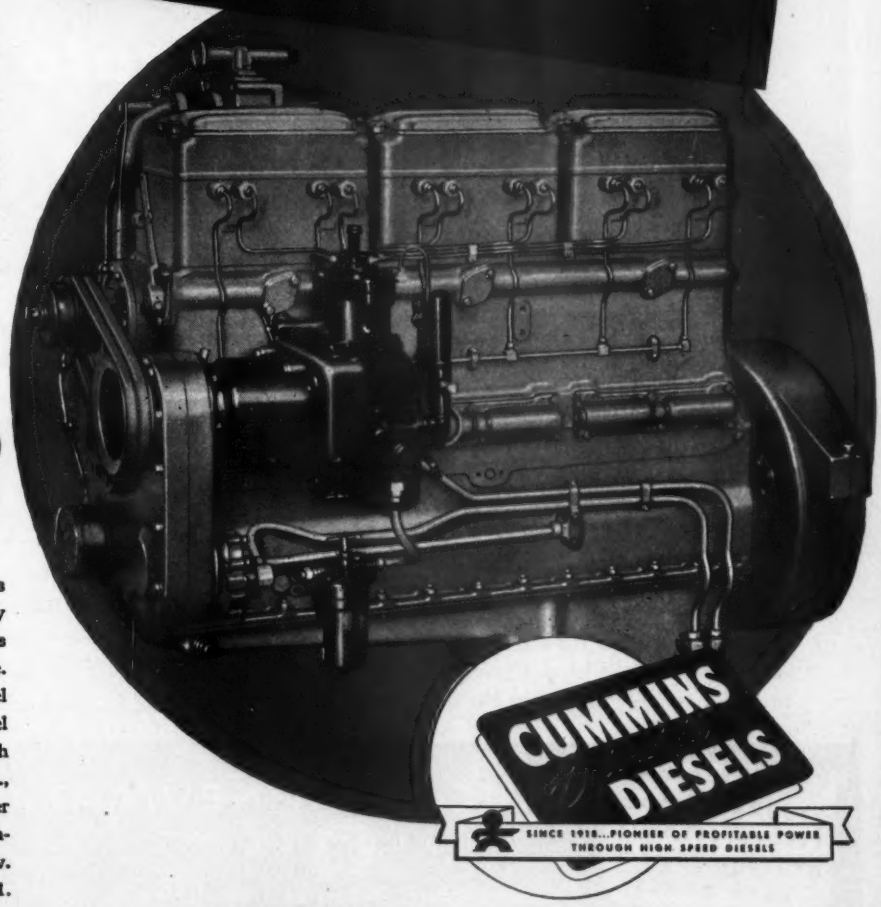


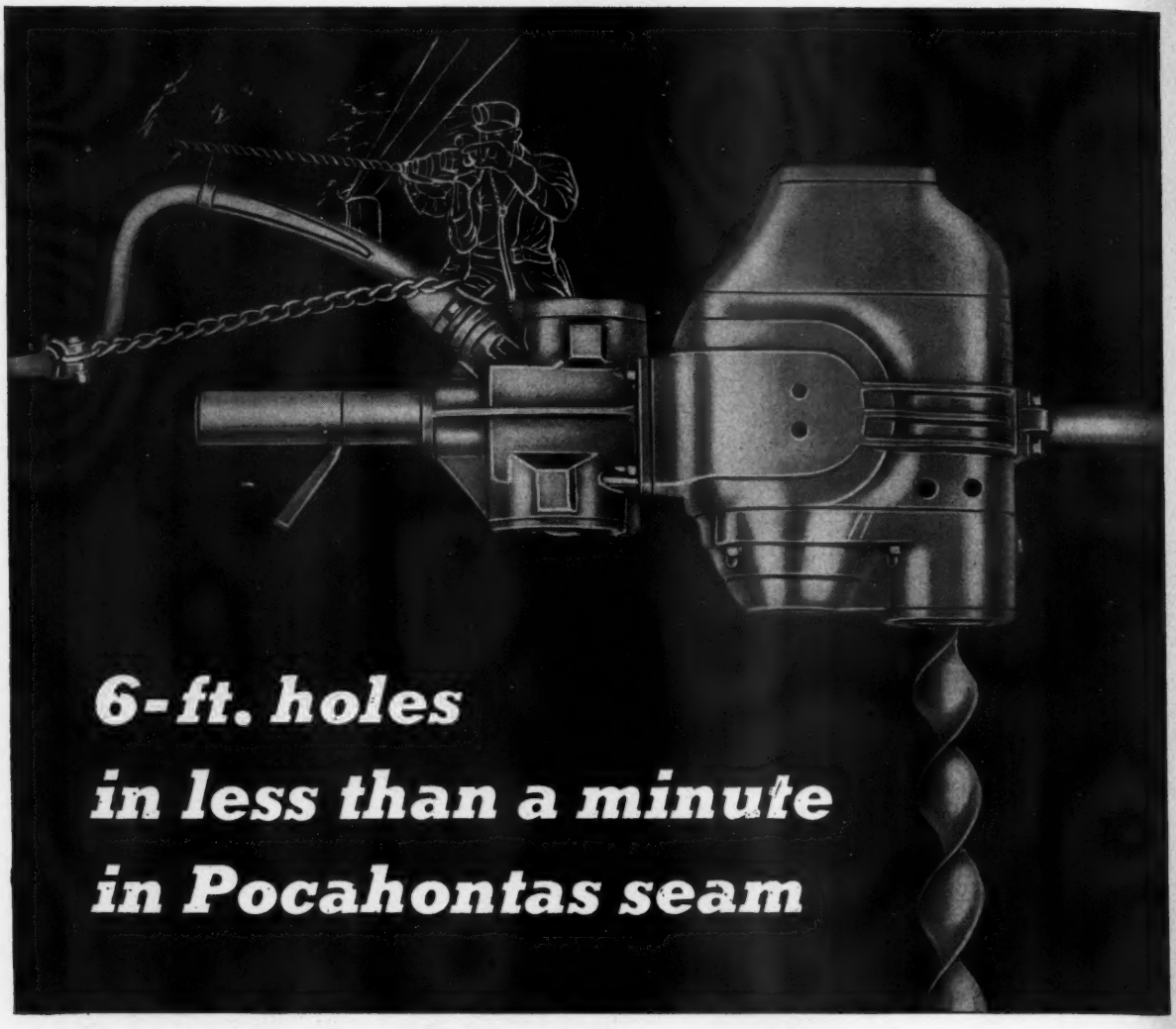
For generating service as well as for direct diesel drive, you can rely on Cummins Dependable Diesels for reliable, low-cost performance. Model HGA-601 (AC) and Model HGD-601 (DC) Cummins Diesel Generating Sets are offered with two ratings: 35 kw. at 900 rpm., and 50 kw. at 1200 rpm. Other models are manufactured in capacities ranging from 15 to 125 kw. Illustrated is the Model HGA-601.

or every mining operation . . . above ground or below . . . stripping, loading, hauling or generating . . . there's a Cummins Dependable Diesel whose long record of proved performance is your assurance of getting the job done—in less time—for less money.

CUMMINS ENGINE COMPANY, INC.

Columbus, Indiana





CP-571 Hand-Held Electric Coal Drill

WORLD'S fastest electric coal drill, the "Whippet," CP-571 Hand-Held Drill is equipped with a powerful, compound-wound D.C. motor and special safety clutch, enabling it to set new highs in drilling speeds. Six-foot holes in less than a minute in Pocahontas Seam is typical of the "Whippet's" outstanding performance.

Easily handled by one man in softer coal seams, the CP "Whippet" weighs only 40 lbs. in Open type – 43 lbs. in Permissible model.

Ideal for close quarter work, the record-breaking CP-571 drills parallel holes within 2″ of top and bottom. Write for SP 1995, giving full data on the CP Hand-Held "Whippet."

Chicago Pneumatic manufactures the world's largest line of Hand-Held and Post-Mounted Electric Coal Drills: five sizes in the Hand-Held types and four sizes in the Post-Mounted models.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
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★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

WORKING WHERE IT'S WET?

Get to know "Monobel" AA —a new water-resistant permissible

Du Pont developed "Monobel" AA to meet the need for a dependable, water-resistant coal producer.

"Monobel" AA is a new, strong, low velocity, ammonia permissible waterproofed by a basically new method. It is ideal for wet work in thick, hard-shooting seams regardless of whether top or bottom cutting is practiced. Furthermore, it costs less than gelatinous permissibles usually required for wet work of this type.

"Monobel" AA shoots coal for efficient mechanical loading . . . and it produces a high percentage of coarse coal, resulting in better realization.

Talk with your Du Pont Explosives representative for complete information. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

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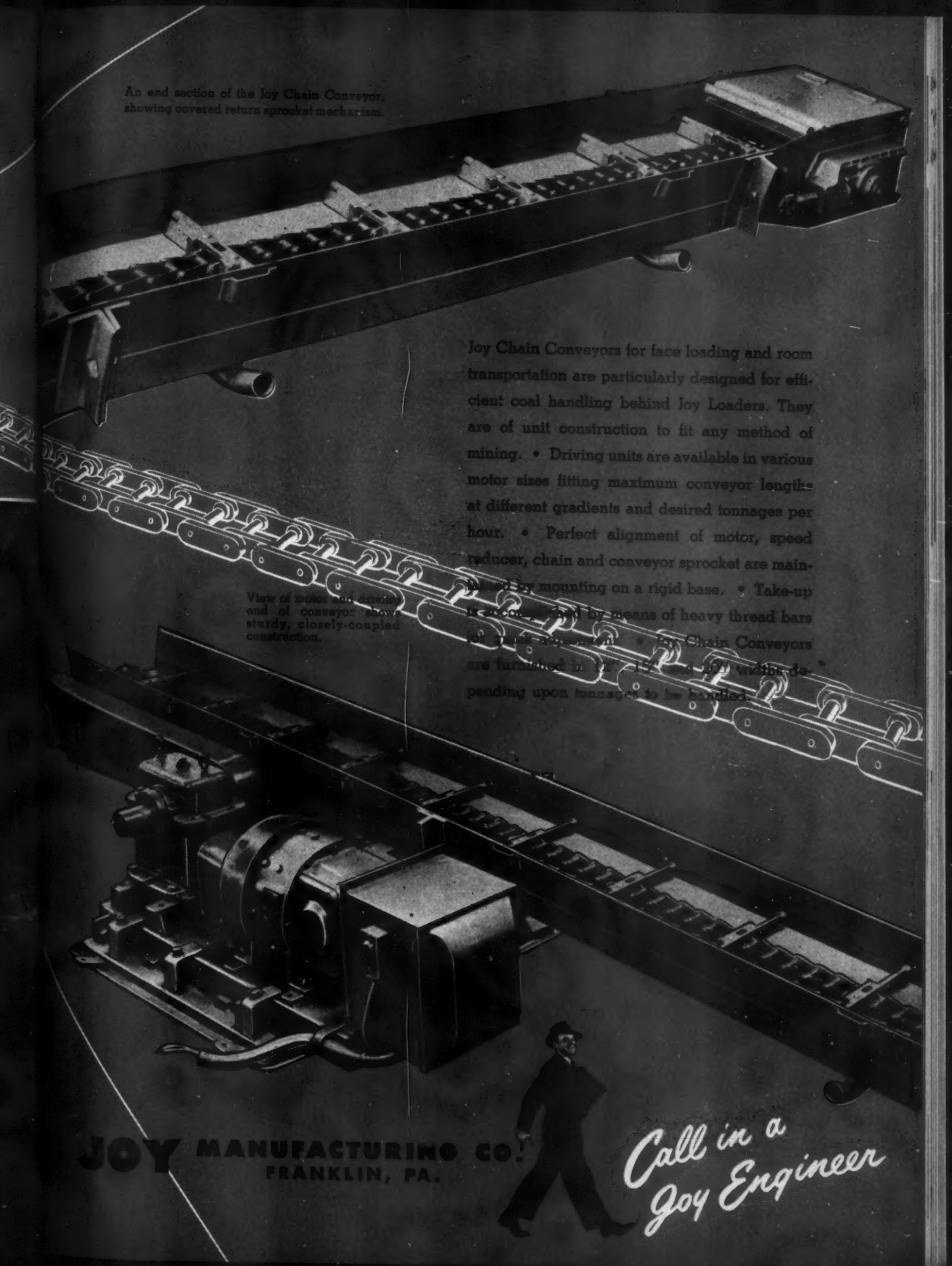
DU PONT PERMISSIBLES

Blasting Supplies and Accessories

NURSES NEEDED NOW
URGE ENLISTMENTS
IN U. S. ARMY NURSES CORPS

JOY
CHAIN AND BELT
CONVEYORS
give you smooth, fast quantity haulage.
COMPLETE SELECTION OF CHAIN WIDTHS AND MOTORS TO CARRY YOUR HEAVIEST LOAD ECONOMICALLY
Working in coordination with Joy Chain Conveyors, a Joy Belt Conveyor, such as the one pictured below, can greatly speed tonnage output, lower production costs.



An end section of the Joy Chain Conveyor, showing covered return sprocket mechanism.

Joy Chain Conveyors for face loading and room transportation are particularly designed for efficient coal handling behind Joy Loaders. They are of unit construction to fit any method of mining. • Driving units are available in various motor sizes fitting maximum conveyor lengths at different gradients and desired tonnages per hour. • Perfect alignment of motor, speed reducer, chain and conveyor sprocket are maintained by mounting on a rigid base. • Take-up is accomplished by means of heavy thread bars [illegible] Joy Chain Conveyors are furnished in [illegible] widths depending upon tonnages to be handled.

View of motor and [illegible] end of conveyor showing sturdy, closely-coupled construction.

JOY MANUFACTURING CO.
FRANKLIN, PA.

Call in a Joy Engineer

3
48

3-WAY ENGINEERING POINTED THE WAY TO 48-OZ. DUCK CONVEYOR BELTS

FOR COAL
FOR ROCK
FOR ORE

Many successful conveyor systems using 48-oz. duck belting developed by U.S. Rubber have been engineered for coal mines—both for underground and slope installations . . . also for handling rock and ore on big jobs involving long centers, high lifts, and heavy loads.

The success of these installations is due to closely coordinated planning on the part of the engineers representing mine operators, conveyor equipment manufacturers and United States Rubber Company . . . a "teamwork" policy you will find advantageous. When you plan a new conveyor system let our engineers work with you.

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon, 3:00 to 4:30 E.W.T.

UNITED STATES RUBBER COMPANY

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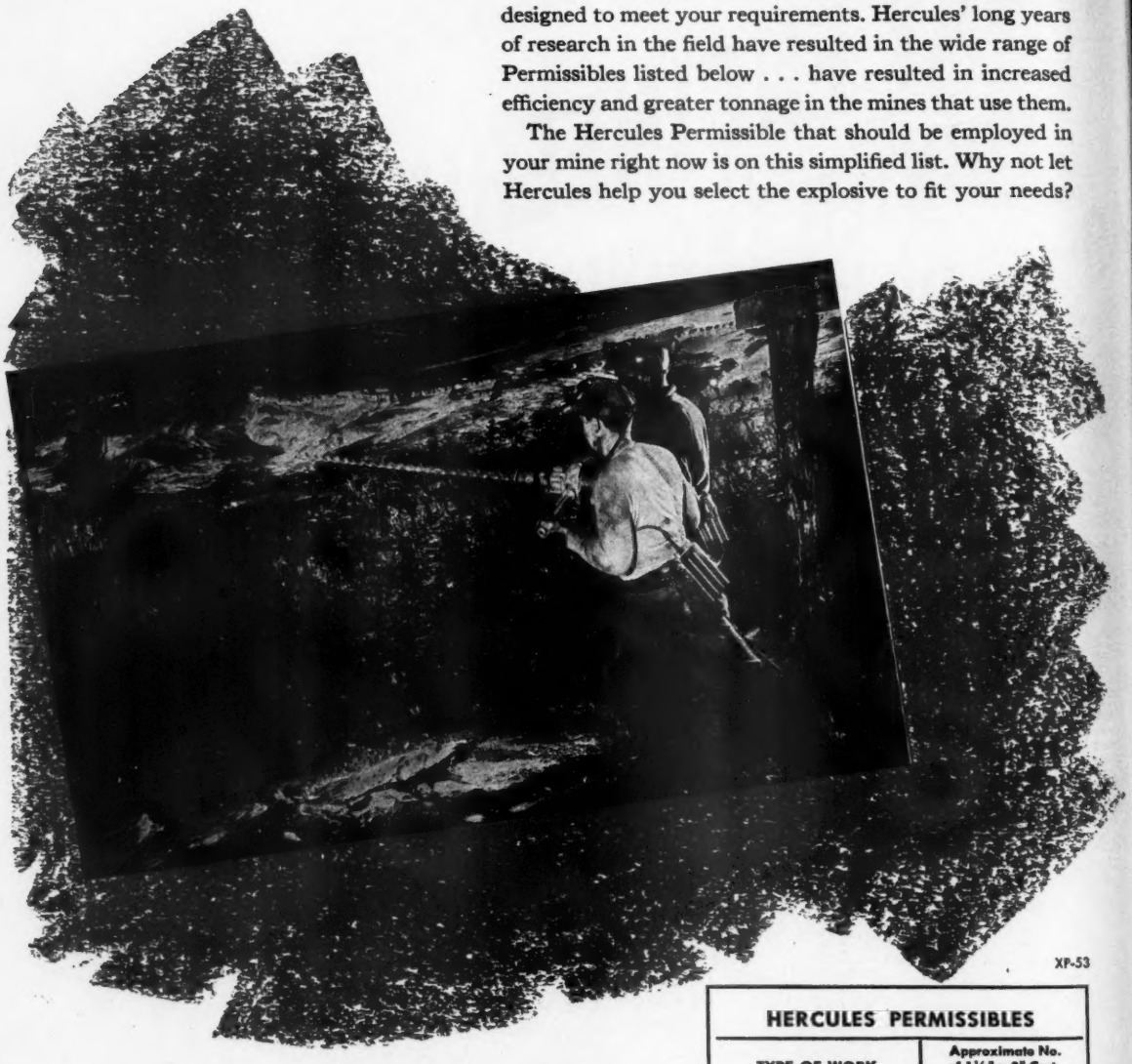
SERVING US *THROUGH SCIENCE*

FOR MAXIMUM COAL PRODUCTION

There's a Hercules Permissible that fits your needs!

Whatever your particular problem or purpose in blasting . . . there's a Hercules Permissible Explosive specifically designed to meet your requirements. Hercules' long years of research in the field have resulted in the wide range of Permissibles listed below . . . have resulted in increased efficiency and greater tonnage in the mines that use them.

The Hercules Permissible that should be employed in your mine right now is on this simplified list. Why not let Hercules help you select the explosive to fit your needs?



XP-53

HERCULES PERMISSIBLES	
TYPE OF WORK	Approximate No. of 1¼" x 8" Cartridges per 100 lbs.
For Lump Coal	
Red H* C	276
Red H* D	316
Red H* F	356
For Rock or Fine Coal	
Red H* B	280
Collier* C	320
For Wet Work	
Hercogel* A	200
Hercogel* 2	240

HERCULES

EXPLOSIVES DEPARTMENT

HERCULES POWDER COMPANY
INCORPORATED

934 KING STREET
WILMINGTON 99, DELAWARE

*Reg. U. S. Pat. Off. by Hercules Powder Company

EXIDE POWER

HELPS TO HANDLE THE BIGGEST COAL TONNAGE IN HISTORY...

ACCORDING to many operators who helped to make 1944 the biggest year in coal history, three factors are chiefly responsible: men, management, and machines. And not the least of these are the machines —undercutters and loaders; fast, flexible shuttlecars; and hard-pulling locomotives. Exide power can be depended on to keep this tonnage rolling. That is why more mine operators use Exide-Ironclads than any other battery.

Exide Batteries have the extra power needed to meet today's increased production schedules. They enable shuttlecars and locomotives to operate at sustained speeds throughout the day. And their rugged construction keeps them on the job, performing dependably, with long-life and ease of maintenance. When you buy an Exide, you *Buy* to *Last.*

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to profit from the long-life built into every Exide Battery. Ask for booklet Form 1982.

ARMY E NAVY

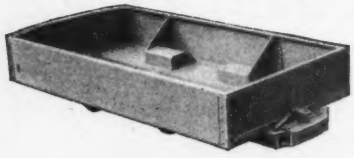
Exide
BATTERIES

ALL OUT FOR THE MIGHTY 7th WAR LOAN

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

★ PHILLIPS ★

MINE and AUXILIARY EQUIPMENT

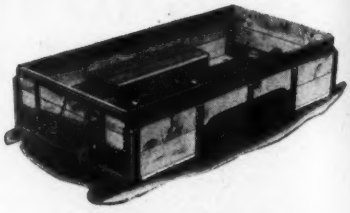


STEEL MINE CAR

Featuring simplicity of design and built to stand utmost abuse. Modern welding, riveting and all-steel construction. With over three-quarters of a century experience in mining equipment—PHILLIPS can meet the most exacting demands.

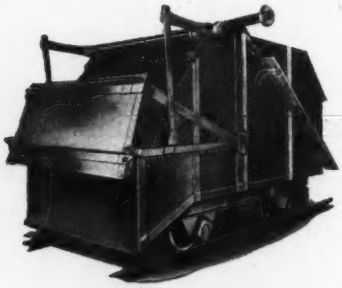
LOADER CARRIER FOR MINES

Sturdily constructed to carry the heaviest loaders, the PHILLIPS Loader Carrier requires only three inches of head room. Timken Roller Bearings, wheels removable for loading, wide treads for short curves and built for any track gauge. An excellent general utility car.



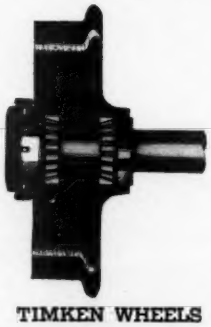
COMPOSITE MINE CAR

An economical mine car built to PHILLIPS standards to meet severe usage. Withstands excessive speeds, abuse and overloading. Riveted and bolted construction. Fabricated of steel and wood for extra capacity.



MONITOR CARS

Invaluable in mountainside coal-mining service, with descending loaded car pulling up the empty. 10 to 13-ton capacity, all-steel construction. Timken Bearing equipped.

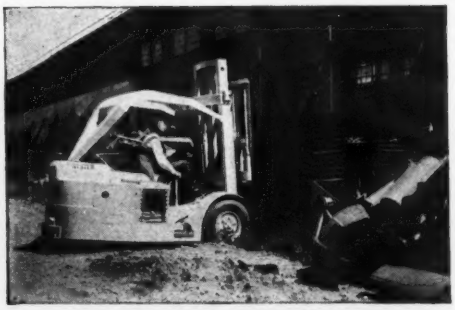


TIMKEN WHEELS

For mine and industrial use. Available in chilled cast iron and machined cast steel with Timken Tapered Roller Bearings. Can be furnished complete with Bearings, Axles and Journal Boxes.

STEEL MINE TIES

PHILLIPS "Wedgegrip" Steel Ties quickly position track with small wooden wedges. Adaptable to various weights of rail sections, especially light rails. Can be used for extending rails and bringing track up to working face. Two-inch channel, weight 1.87 per foot.



HYSTER 75 LIFT TRUCK

Pneumatic tire mounted, equipped with dependable gasoline-powered engines, the HYSTER 75 offers a worthwhile saving of labor results. Trunnion steering . . . standard controls . . . finger-tip telescopic lift.

For fast dumping, write for data on the PHILLIPS Automatic Cross-Over Dump!

Get the PHILLIPS facts!

HYSTER "KARRY KRANE"

The mobile general utility crane designed for hard, steady mine service. Maneuverability and traction, with four speeds forward, four in reverse. Boom positions easily changed. Five ton capacity.

MANUFACTURERS SINCE 1863

PHILLIPS MINE AND MILL SUPPLY COMPANY

PITTSBURGH, PENNA.

MINE AND INDUSTRIAL CARS—FABRICATED STEEL—IRON CASTINGS

MARION HAS THE ANSWER!

What is Your Material Handling Problem?

Mining will benefit materially from the billions of dollars now being set aside for postwar developments.

To meet the demand that will exist for proven equipment, MARION has a machine of the right size and type from ¾ cubic yard to 35 cubic yards.

Put a fast, powerful MARION on that postwar job—then watch the rock and dirt fly!

Let's discuss your problems!

THE MARION STEAM SHOVEL CO. • MARION, OHIO

SHOVELS • DRAGLINES • CRANES • PULL-SHOVELS

CLAMSHELLS • WALKERS • from 3/4 cu. yd. to 35 cu. yds.

Take a Load out of Your Mine!

COAL

The 460 Goodman — a fast, high capacity loader that moves coal from face to mine car on a money-making schedule of time and tonnage.

ARMY E NAVY

Goodman MANUFACTURING C

ORE
The 125 Conway — a tough, little machine that combines powerful digging action and efficient cleanup in driving drifts in metal mines.

G COMPANY • Halsted Street at 48th • Chicago 9, Illinois

Getting results...in a BIG way!...

In 1939, when Hitler struck at Poland, trucks took only a few hundred thousand tons of ore from America's iron mines. ***In 1944, trucks hauled out*** **OVER 50 MILLION TONS!**

This ore plus scrap metal makes over 35 million tons of steel . . . more than all the steel in all passenger cars now on the road. It is steel enough for almost a million medium tanks . . . or over 110 million 50-cal. machine guns . . . or 15 million big 16-inch Navy shells . . . or more than 800 mighty battleships.

Huge 6-wheel, 30-ton capacity Macks like the one shown below, as sketched by Peter Helck, are doing a lion's share of this big ore-hauling job.

The biggest trucks in standard production today . . . these Macks have *lowered* open pit mining costs, while time and again setting new production records on the job.

Their work is typical of the many, many ways in which Macks, both big and small, are serving the people of America . . . and helping their owners cut costs.

Their stamina is a good example of why Macks for 44 years have been America's No. 1 line of trucks for tough hauling jobs.

★ BUY THAT EXTRA WAR BOND TODAY ★

Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J., New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

Performance Counts!

Certificate of Test and Registry
This is to Certify that we have subjected Acco Registered Wire Rope Sling, Serial No.
to a proof test of pounds
their individual attachments, and to a proof test of pounds on
Order No.
Now!
Registered
Wire Rope
Slings
OFFERED BY
American Cable

This is big news to all who buy and use wire rope slings

• **Full story briefly summarized in Bulletin, "A SLING SERVICE THAT GIVES YOU REGISTERED STRENGTH." Send for it! Opens a new era in the use of slings.**

It means you can now *buy* with full confidence in the slings you order.

It means you can now *use* them with full knowledge of their working strength.

This is assured by the warranty certificate of test and registry issued with each sling.

This new sling service is the result of months and years of test and research by wire rope and sling engineers.

ACCO Registered Wire Rope Slings offer many new features including:

Slings that develop full body strength from end to end . . .

Preformed Wire Rope of Improved Plow Steel Grade . . .

Right combination—Design, Efficiency, Safet SHERS

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

YOUR GREENEST MAN CAN DO IT

A hammer, two hands, and a couple of minutes—that's all you need to install or remove a Bethlehem No. 5 Steel Tie. Sounds pretty simple—and it's just as fast and easy as it sounds.

The greenest man in your track-laying crew can get the hang of it in no time. He doesn't have to worry about gaging track or spiking. All he does is slip the tie under the rails . . . bring the stationary clips snug against the flanges . . . tap the revolving clips into place. There's your tie, fastened securely, ready to bear the full weight of your heaviest cutting and loading machines.

The Bethlehem No. 5 is built for use with 40-lb. rail. It's a sturdy worker, rigid and durable. Good stout section; strong[illegible] only steel can be. Yet it's easy to carry around, [illegible]eighs only 5 lbs. per ft.

No one feature accounts for the savings the No. 5 makes possible. Rather, it's a combination of features —speed of installation, absence of spiking and gaging, and long service life. You'll still be using it after several wooden ties have been spike-killed and thrown away.

For your next 40-lb. track in rooms, be sure you get the bright red Bethlehem No. 5's. In the case of these ties, red means "Go!"

BETHLEHEM STEEL

BETHLEHEM STEEL TIES

HOW TO GET A PRIORITY

on Tomorrow's Coal Markets

BETTER PREPARED,* more uniform coal is the only priority needed to control post-war markets.

Clean coals of low impurity content, uniformly sized, have always brought the best prices—the most customers—the highest profits. They will again!

Morrow Tipples Improve Quality, Raise Product Value, Cut Operating Costs

About ⅓ of the mines in this country are mechanized. Of that ⅓ a very high percentage are Morrow equipped. That's because Morrow *streamlines production of coal* from the mine, through most modern, efficient preparation equipment, to cars and barges, in shorter time, at lower operating costs—*in best condition to* SELL!

Morrow engineers are available *now* to design and equip more efficient preparation plants for post-war operations. Ask Morrow to assign an engineer to study your situation. Write the Morrow Manufacturing Company, 1982 Ford Boulevard, Wellston, Ohio. *Division The Wacker Corporation.*

*Better Preparation
=*INCREASED SALES!*

1. low impurity content
2. correct sizing
3. high uniformity

MECHANIZE WITH MORROW

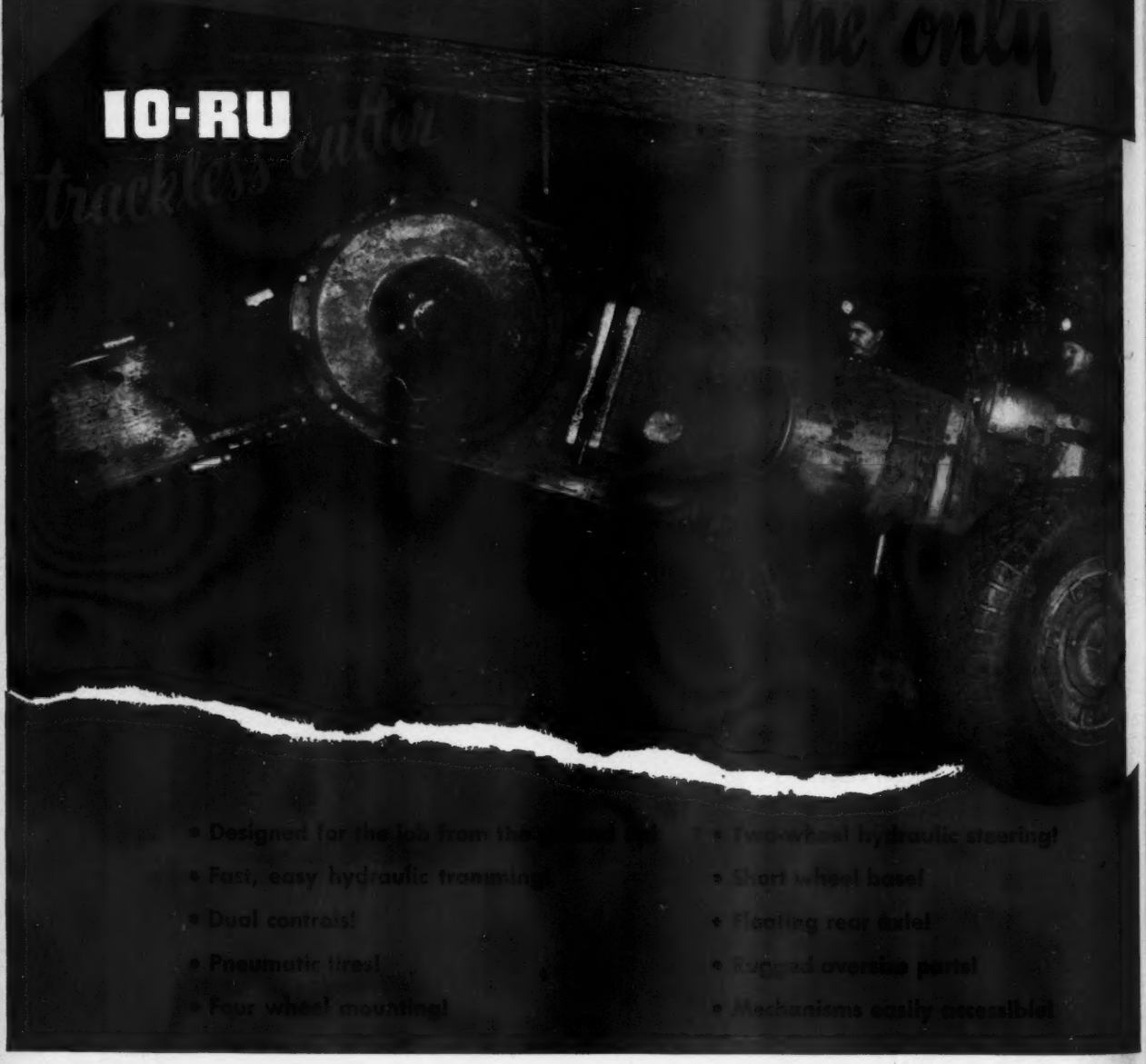
COAL WASHERS • WEIGH PANS • FEEDERS • DUMPS
BINS AND BIN GATES • FLANGED LIP SCREENS
CONVEYORS • LOADING BOOMS • SHAKING SCREENS
VIBRATING SCREENS • CAR HAULS • PICKING TABLES
SETTLING TANKS • ELEVATORS • CAR RETARDERS
PERFORATED METAL SCREENS • STEEL STRUCTURES

ANOTHER SULL

the only

10-RU

trackless scatter



- Designed for the job from the ground up!
- Fast, easy hydraulic tramming!
- Dual controls!
- Pneumatic tires!
- Four wheel mounting!
- Two-wheel hydraulic steering!
- Short wheel base!
- Floating rear axle!
- Rugged oversize parts!
- Mechanisms easily accessible!

ARMY E NAVY

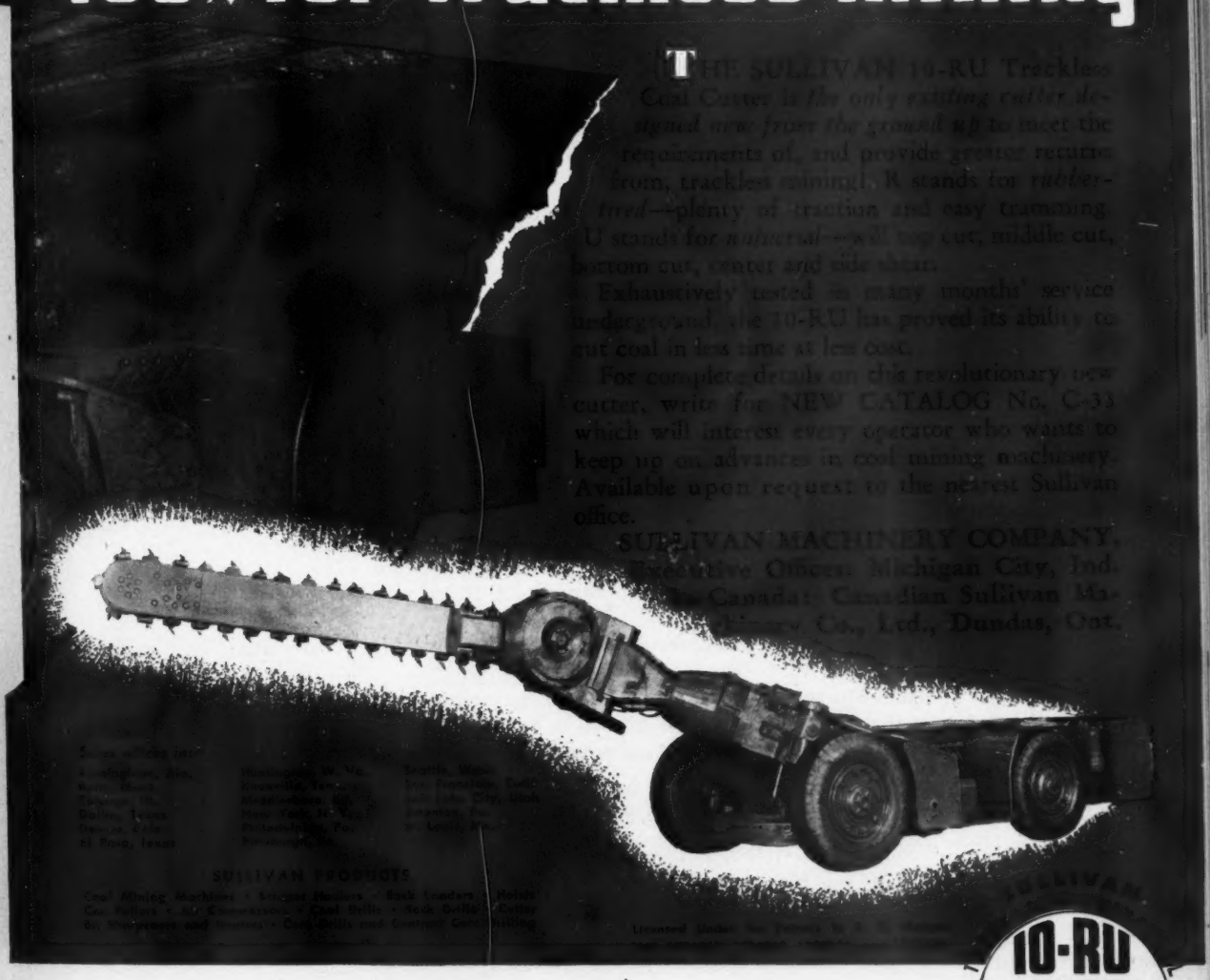
SULL

- a world-wide organization...

LIVAN FIRST..

coal cutter designed...

100% for trackless mining



THE SULLIVAN 10-RU Trackless Coal Cutter is *the only existing cutter designed new from the ground up* to meet the requirements of, and provide greatest returns from, trackless mining! R stands for *rubber-tired*—plenty of traction and easy tramming. U stands for *universal*—will top cut, middle cut, bottom cut, center and side shear.

Exhaustively tested in many months' service underground, the 10-RU has proved its ability to cut coal in less time at less cost.

For complete details on this revolutionary new cutter, write for NEW CATALOG No. C-33 which will interest every operator who wants to keep up on advances in coal mining machinery. Available upon request to the nearest Sullivan office.

SULLIVAN MACHINERY COMPANY.
Executive Offices: Michigan City, Ind.
In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ont.

SULLIVAN PRODUCTS

Coal Mining Machines • Loading Machines • Rock Loaders • Metal Mine Haulers • Air Compressors • Coal Drills • Rock Drills • Cutter Bit Sharpeners and Grinders • Core Drills and Diamond Core Drilling

10-RU COAL CUTTER

IVAN

....established 1851 -

The Future Market for Coal

WILL BE *HIGHLY CRITICAL!*

CAREFULLY prepared coal is the paramount issue in the coal industry.

Only the plants that produce clean coal of uniform quality will meet the market requirements for steam, metallurgical and domestic coal.

Alert operators know this! They are planning now—and building for tomorrow.

To be competitive—costs must be reduced—tonnages must be increased. Complete mechanization above and below surface—in mining, handling and preparation—is the answer.

Now is the time to discuss your future needs with experienced Link-Belt Engineers.

LINK-BELT COMPANY

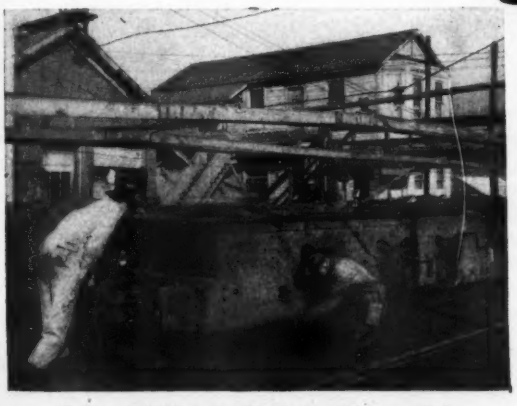
Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8, Vancouver

Preferred by Mines Everywhere Because They Provide Maximum Safety!

A size for seams of any thickness

84A, 14" high, 7" lift
85A, 17" high, 10" lift
86A, 20" high, 13" lift
5-tons capacity. Toe lift on all sizes.

Lift from a minimum height of 1¾". Other Simplex Automatic Lowering Jacks in 10, 15 and 20-ton capacities.



Cars and light locomotives are quickly re-railed with Simplex Jacks.

Moving a coal cutter with a Simplex No. 85A Jack.

Simplex General Purpose Mine Jacks

To furnish added safety, the following characteristics have been embodied in Simplex "A" Series Automatic Lowering Jacks: *double lever sockets, stronger cadmium plated springs and links, shorter fulcrum centers, longer and wider concave rack bar toe lifts, larger trunnion bearings, larger and stronger pawls, reinforced inner-ribbed housings, and greater inbuilt strength. All parts are interchangeable except the housings and rack bars.*

These Simplex Jacks are invaluable for use with coal cutting and loading machines and are also widely employed for re-railing mine cars and light locomotives, mine trackwork and for lifting and moving all types of mechanical equipment. They are fast operating and efficient. Light weight is made possible by the use of high strength alloy steels.

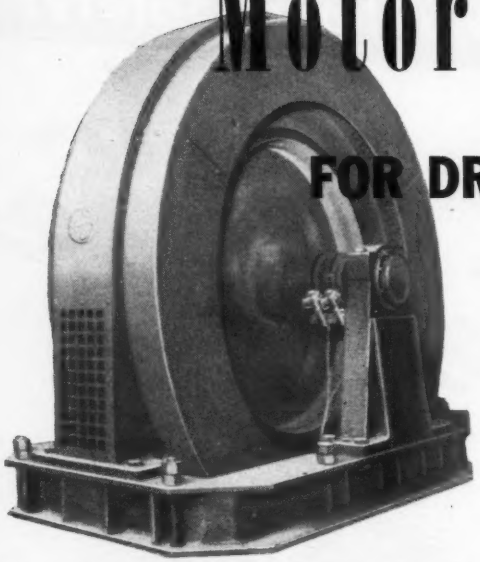
Profit through time saving by having one of these Simplex Jacks on every coal cutter, loader and locomotive.

TEMPLETON, KENLY & CO.,
CHICAGO (44), ILLINOIS

Better, Safer Jacks Since 1899
Simplex
LEVER SCREW HYDRAULIC
Jacks

Motor Drives That

FOR DRESSING LOW-GRADE ORES



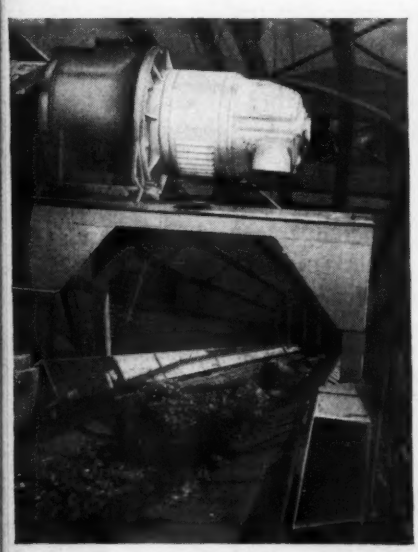
Keep tomorrow's profit margins up with the help of G-E motors like these

WHEN you're dressing low-grade ores, the cost of maintaining motors is critical. Savings in service expense can be an important factor in keeping operations profitable as ore grades go down.

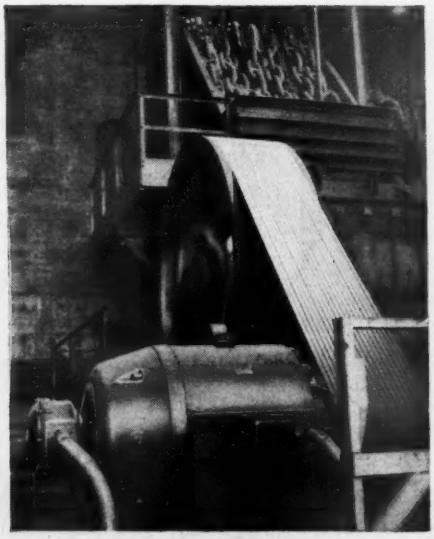
Here are some typical installations of G-E motors on hard-working ore-preparation drives—installations that help to prove an unusual ability to take the punishment of round-the-clock operation and wartime overloads. The reasons: G.E.'s long motor experience *combined with application engineering based on thorough familiarity with mining and ore-dressing work.*

Furthermore, G.E. is able to apply, from among its standard designs, motors specially protected from dust, dampness, and other adverse conditions that may exist in your ore plant. This line of motors, the nation's widest, includes splashproof and gas- and dust-explosion-proof motors for both a-c and d-c, as well as gear-motors, brake-motors, and vertical motors.

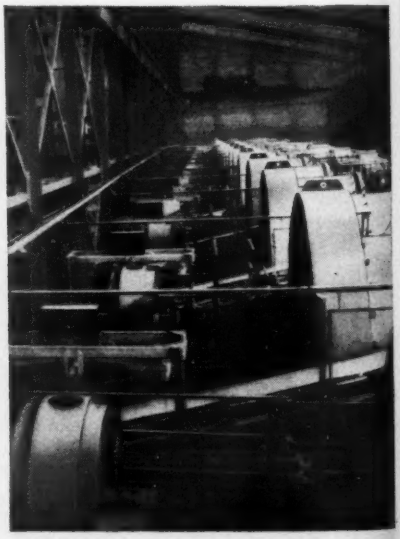
G-E engineers can help you apply these motors to the end that you will not only save on maintenance, but will also save on power cost. You will get motors that are right for the job—from the standpoints of horsepower, torque characteristics, and power factor. If you'd like to plan *now* on cutting the cost of ore dressing, call the G-E office nearest you. *General Electric Company, Schenectady 5, N. Y.*



Providing adjustable-varying-speed power for this conveyer, this G-E wound-rotor induction motor (15 hp, 440 volts, through 112-rpm speed-reducing gear) is installed on a placer-mining dredge.



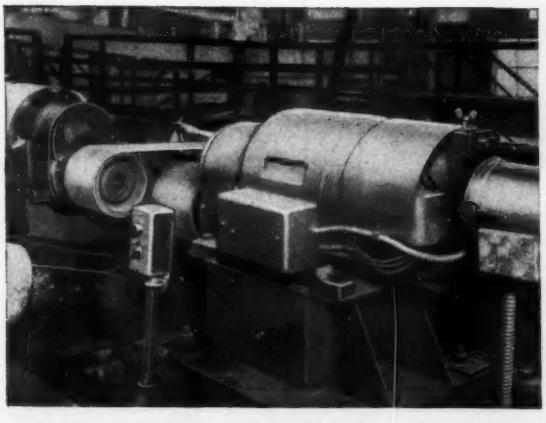
This fan-cooled, wound-rotor induction motor (200 hp, 900 rpm, 2300 volts, 60 cycles) is totally enclosed to protect it from abrasive dusts while operating a main jaw crusher.



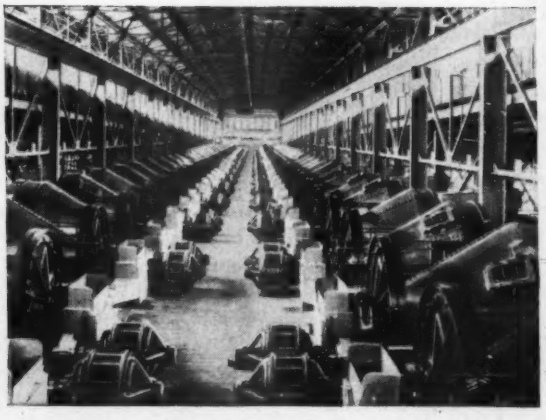
When special motors are essential, G.E. has the experience to engineer them expeditiously. Here are 18 G-E 800-hp, 257-rpm special high-torque synchronous motors, each geared to a Marcy ball mill.

Save on Service

This large metal refining mill uses 130 Tri-Clad motors to power flotation cells. Those shown are rated 3 hp, 1200 rpm.



These G-E adjustable-speed a-c gear-motors drive rake classifiers. Compact and well protected, they have higher operating efficiency than any other low-speed drive of comparable installation cost.



32 years of service! These 64 G-E induction motors in a mid-western regrinding plant were installed in 1912, yet they are still giving dependable service, with very little maintenance.

Buy all the BONDS you can—and *keep all you buy*

GENERAL ELECTRIC

Mining Problems are Solved by Brown-Fayro EQUIPMENT

Cut Mine Drainage Costs

Gathering Pumps—if they're Brown-Fayro —offer savings in drainage costs. Austin Brownie Perfect Oiler Pumps are built in ratings of 30 to 100 GPM against heads up to 250 ft., with cylinders to handle any kind of mine water. The 6x6 V-belt driven pump is illustrated.

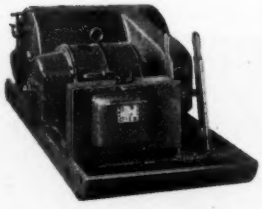
Cut Post Pulling Costs

Save post-pulling costs with this new Post Puller that has been developed to recover props and headers in worked-out sections of coal mines. The timbers which are recovered can be used again, affecting considerable saving in operating costs.

Cut Car Spotting Costs

Costs can be reduced by using the type of hoist best suited to your conditions. Cars are accurately placed at loading points, production is not lost when changing trips, and maintenance costs are low.

Cut Equipment Moving Costs



Use a portable hoist to move conveyor parts and equipment. Operators using HGD rigging hoist for this purpose report the man hours needed to move a conveyor unit amount to only 40% of the time required by former methods.

Here's Why:

Brown-Fayro has a long line of mine equipment — in many sizes and models — designed to lessen your mine jobs and save you time and materials.

Engineers at Brown-Fayro for years have specialized in mine equipment. They are familiar with the unusual requirements of the mining industry, and this background of experience enters into the design of all Brown-Fayro products.

You get real savings — plus *increased* production — when you specify Brown-Fayro equipment. If you are not familiar with all of the Brown-Fayro products, write today for leaflets on the illustrated machines, or on mine cars, layer loading hoists, tubing blowers, room hoists, car retarders, sheaves and rollers, rerailers and derailers.

THE BROWN-FAYRO COMPANY

JOHNSTOWN, PENNA.

THERE'S ONLY ONE AUTOMATIC MECHANICAL COAL LOADING "SHOVEL"--

There's only one natural way to load coal —shovel it. And the Whaley "Automat" is the only loader that does just that.

★ Any good engineer will tell you—"Design a machine, first of all, to do its job the simplest and most natural way possible."

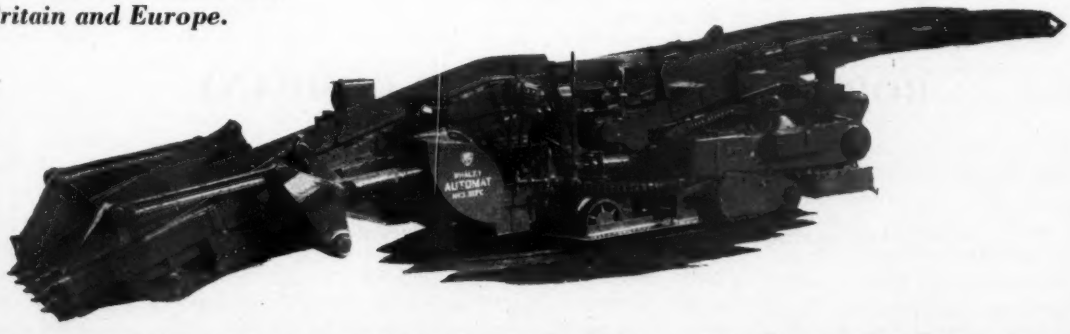
This fundamental engineering principle was the foundation upon which the Whaley "Automat" was designed, perfected and built.

As originators of the first commercially successful underground loading machine and, from the beginning, devoting our time and attention exclusively to underground loaders, you have 37 years of "know how" embodied in the Whaley "Automat" you buy . . . 37 years of constant improvement of loading machines with shoveling action.

Whaley "Automats," numbers 3 and 3LS, stand alone, among large capacity loaders, as the only loader to be powered by one 25 H.P. motor (power consumption 1/5 K.W.H. per ton of material loaded). It stands alone in its ability to load slate or rock, equally as well as coal. It stands alone in its safety of operation. And remember, the "Automat" is built to deliver the goods now and for many years to come . . . for it's the long-life machine.

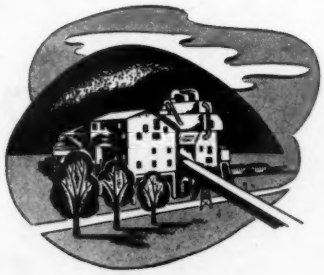
When writing for details, please state your mining conditions. Myers-Whaley Co., Knoxville 6, Tenn.

Wm. Neill & Son, Ltd., St. Helen's Junction, Lancashire, England, are licensed for manufacture and sale in Great Britain and Europe.



MYERS-WHALEY

Mechanical Loaders Exclusively For Over Thirty-Seven Years



Prepare your coal the R and S way

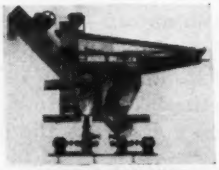
To design and build plants for preparing coal to satisfy specific use requirements in hotly competitive markets—that is the business of Roberts and Schaefer.

The R and S method is complete:

- an exhaustive engineering analysis of your property and product, by capable specialists.
- a design to suit your individual operation.
- an erected plant—placed in efficient operation.

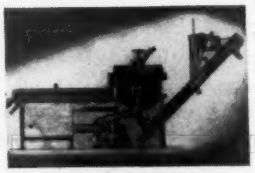
Best and most convincing indorsement of that method is its conspicuous success . . . the effective, low cost performance of outstanding plants of leading operators.

For further information write for descriptive bulletins



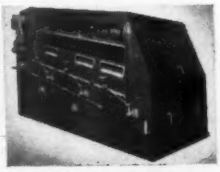
HYDRO-SEPARATOR

For washing all coarse coal—improved launder type. Bulletin No. 161.



HYDROTATOR

For efficient washing of small sizes. Automatic, simple, economical. Bulletin No. 162.



STUMP AIR-FLOW

For low-cost dry cleaning of all fine coal. Bulletin No. 163.

ROBERTS and SCHAEFER COMPANY

307 NORTH MICHIGAN AVENUE

CHICAGO 1, ILLINOIS

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PITTSBURGH, PA.

P. O. Box 570
HUNTINGTON, W. VA.

Mining CONGRESS JOURNAL

Published for the Entire Mining Industry by The American Mining Congress
S. A. TRENGOVE, Editor

Volume 31 MAY, 1945 Number 5

Interested Observer

MR. AVERAGE CITIZEN, looking down the long list of events in the 1945 coal wage contract negotiations, might seriously inquire, "Well, what did that cost me?"

The answer, Mr. A. C. is "*plenty*, brother!"

John L. Lewis started the ball rolling even before scheduled negotiations when he called for a strike vote. Since this "convincing" device, conducted under government auspices and by government machinery, scored 8 to 1 (bituminous) and 6 to 1 (anthracite) to "permit interruption of wartime production," an already tight coal supply has been further jeopardized by numerous work stoppages. The public paid $300,000 for the ballot!

For the third time since Pearl Harbor, coal mines are under government control and citizens are already fretful over next winter's coal supply.

April 11 saw the new contract signed with considerable net monetary gains to the miners (*$10 a day ain't hay!*), but minus the Petrillo influence of "participating royalties" which packed more TNT than a 10-ton bomb!

The NWLB approved the contract on April 23, giving Economic Stabilization Director W. H. Davis barely time enough for its approval and authorization of increased coal prices before the April 30 deadline to which the old contract had been extended. The late hour of his approval gave rise to additional work stoppages on May 1.

Price increases, Mr. A. C., will average 16 cents a ton over the nation—you absorb this at from 4 to 55 cents, depending on location of the mine serving you. Total bill? By easy arithmetic, $80 million on a half-billion production! The cost of "peace" is actually higher but operators are absorbing an average of at least 9 cents a ton. Hardship lies ahead for many of them, believe us—with no retroactive price relief available to protect them!

Of course, Mr. A. C., you have the complete answer to your labor troubles through various devices at your command: through your public polls, and through Congressional action. Mr. Lewis, in the coal negotiations, has fully demonstrated how little he is concerned with your side of the story—or even with your changing over to other fuels! Your influence, once you go into action over the whole labor front will, we are sure, bring—at long last—justice to many troublesome labor problems.

Trade Agreements—WITH CARE!

H. R. 2652—Extending the Authority of the President Under the Reciprocal Trade Agreements Act—needs to be substantially amended if, while seeking to increase foreign trade through lowered tariffs, it would also avoid committing wholesale industricide at home.

Our mines are *especially* in danger! "Have-not" propaganda to the contrary notwithstanding, our mines are, and for long years will be, tremendously powerful assets both in peace and in war. Suggestions that we conserve our resources by shutting down our mines and importing our requirements from abroad ignore the basic nature of mining operations and do not merit serious consideration.

Several changes are required in H. R. 2652. Two stand out: *Limit the extension to one year* and *delete the 50 percent further reduction clause.*

A year's extension is logical at this juncture—and let's see how things are shaping up before committing ourselves further.

1930 metal and mineral tariff rates, mostly unchanged from the 1922 Act, represented minimum protection needs of domestic industry. Reductions under agreements on zinc, lead, cadmium, molybdenum, petroleum, and other mineral items, have already brought serious consequences to American mines (including coal) in spite of comforting "assurances" of trade officials that no harm would be done. The effect of duty cuts already made has thus far been largely obscured by war conditions. Fifty percent more would be calamitous.

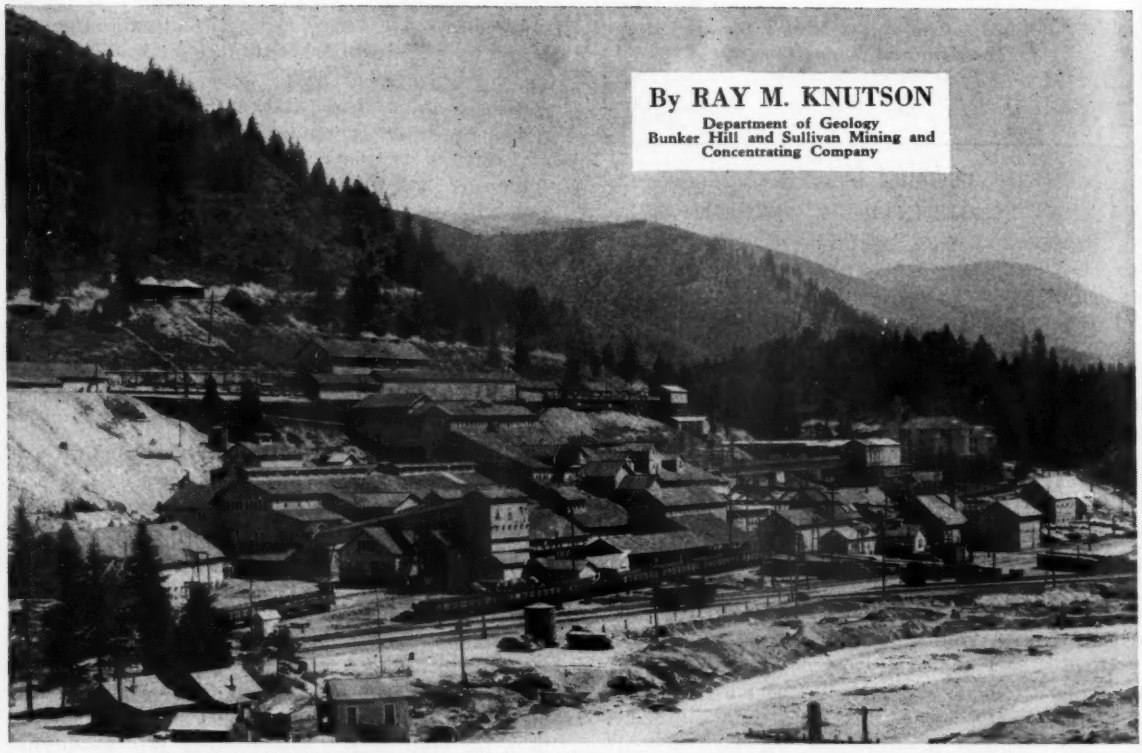
Announced policy to make tariff concessions *only to that country which constitutes the principal source of imports* has not been adhered to. As a consequence, *major benefits have accrued to countries from whom we received no concessions in return!* Correction needed? Definitely!

"Escape clauses" should be made mandatory. Failure to apply them where clear-cut need is shown has been an outstanding weakness of the program, on which Congress itself should act. *Wherever substantial injury results*—whether from "third-country" imports, depreciated exchange rates or other cause, there should be automatic machinery to withdraw or modify the concession.

To firm matters, Congress, representing the people, should have the right to review and pass upon all trade agreements before they become effective. These arrangments virtually hold power of life or death over industry. They must not be entrusted to men imbued with a fervent desire to increase imports even at the sacrifice of the American producer, but *must be made the responsibility of a Government agency directly accountable to the people!*

Coeur D'Alene Mines
Yield Billion Dollars

By RAY M. KNUTSON
Department of Geology
Bunker Hill and Sullivan Mining and Concentrating Company



The Morning Mine's surface plant at Mullan, with the adit just out of view to the left. This is a property of the Federal Mining and Smelting Company, a leader in the region's mining industry

This Famous District Which Commenced With Gold Mining in 1879 Has Recently Joined the Ranks of the World's Billion Dollar Ore Producers

THE Coeur d'Alene mining region in 1943 passed the billion dollar mark in metals production. The district thereby joined the seven previously listed as billion dollar districts.*

In terms of recovered metals, the lead, silver, zinc, copper, and gold mined from 1884 to 1943, inclusive, had an aggregate value of $1,016,686,304, according to the 1943 "Minerals Yearbook" of the U. S. Bureau of Mines. This sum is, incidentally, 77.1 percent of the total value of these five metals produced in Idaho since 1863, beyond which year statistics are not available. Dividends paid by companies of the district through 1943 had a total value of $188,654,332. Figure 1 indicates the relative importance through the years of the principal metals. Lead alone has accounted for 56.7 percent of the production to date. Especially noteworthy of recent years has been the rising importance of silver in the district, while the war's demands in 1943 pushed zinc to the top ranking position for the first time.

* *Mining and Metallurgy*, July, 1944, p. 331. The seven reported: Bingham, Utah; Broken Hill, New South Wales; Butte, Mont.; Mesabi, Minn.; *Copper Country*, Mich.; Witwatersrand, South Africa; and Sudbury, Ont.

The District and Its Ores

The Coeur d'Alene mining region (see map) is loosely defined to include an area of about 500 square miles located in central Shoshone County of northern Idaho, in the upper drainage basin of the Coeur d'Alene River. Metal production statistics for all of Shoshone County are commonly accepted as of the Coeur d'Alenes. The resulting error is very small in proportion to the huge production properly accredited to the Coeur d'Alene region.

The ore deposits are largely fissure veins of the replacement type, with argentiferous galena, sphalerite, and an argentiferous tetrahedrite providing most of the metals recovered. Crossing the district from east to west are two branches of the Coeur d'Alene River, the North and South Forks. Erosion of the pre-Cambrian sediments has been deep, so that altitudes range from 2,250 to 6,826 ft. This uniformly rugged topography has invited the utilization of long adit

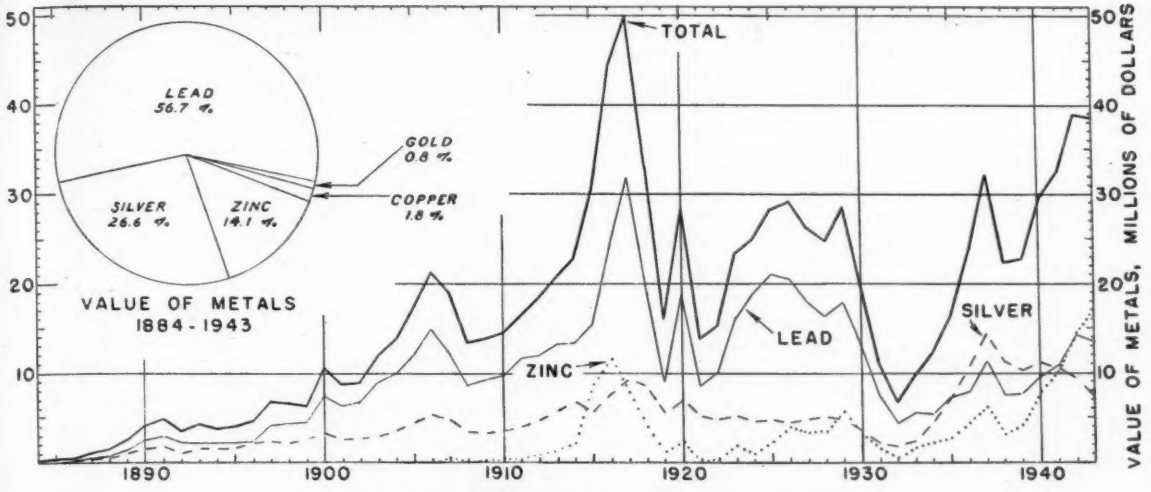


Fig. 1. Annual value of lead, silver and zinc in the Coeur d'Alenes

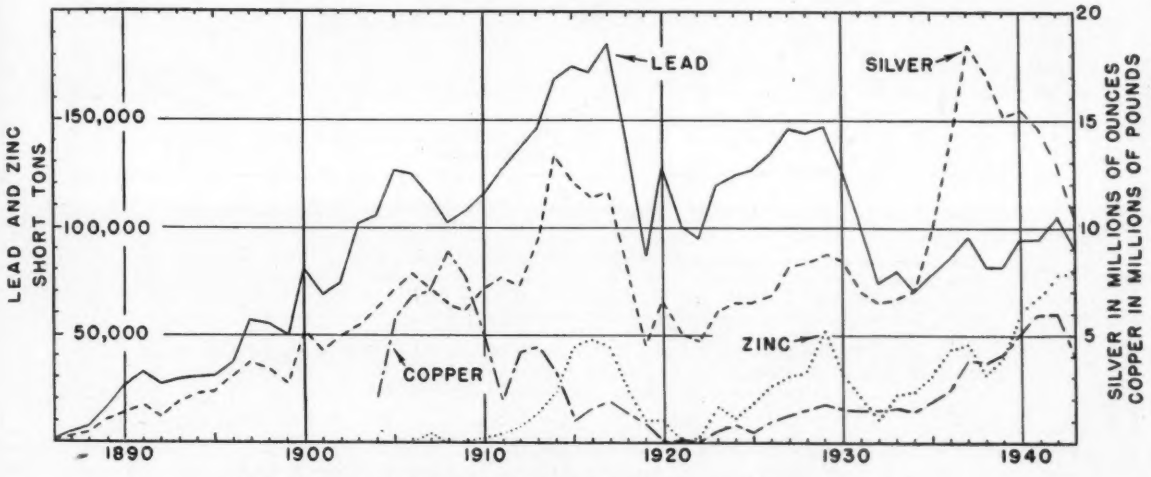


Fig. 2. Annual production of its four leading metals in terms of recovered metal

entrances to the mine workings from the deep valleys. The leading towns are Kellogg, Wallace, Mullan, and Burke, all in the South Fork basin. Murray, now a dwindling town on the North Fork, was the focal point of early placer mining activity.

Gold on Prichard Creek, 1879

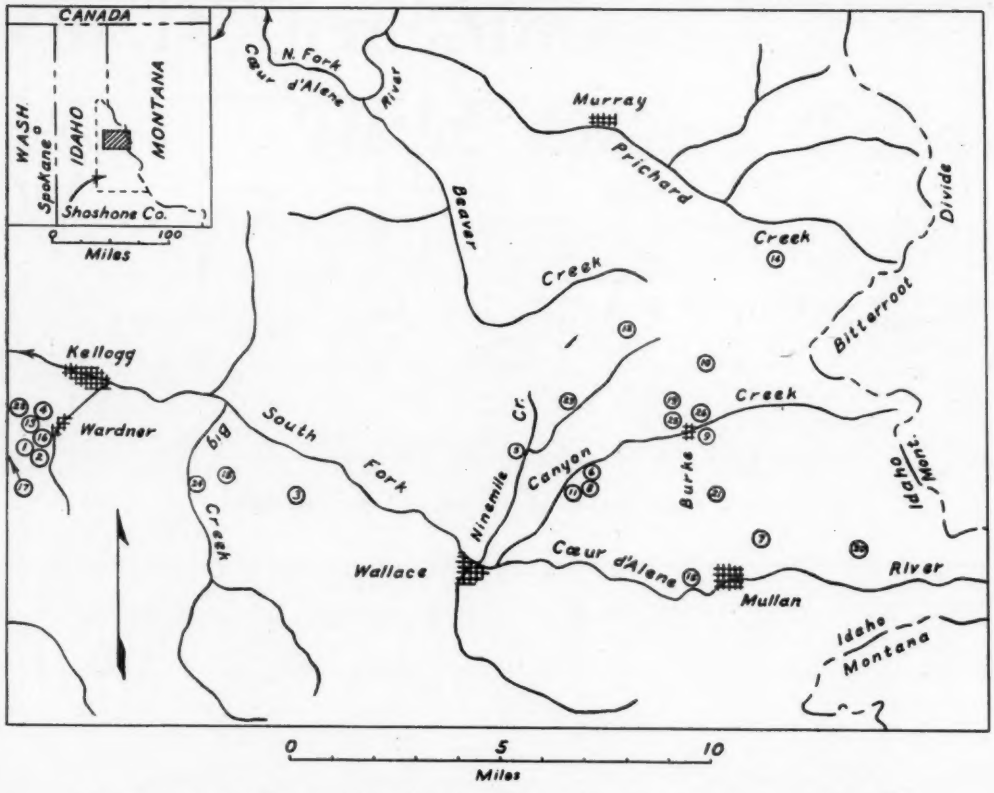
Gold, which brought the mining industry to the region, was discovered in 1879 at Prichard Creek on the North Fork of the Coeur d'Alene River. Exploitation of the placer deposits of the gulches and benches began in 1883, and a few gold-quartz veins in the Murray district were also mined. Gold mining in the Coeur d'Alenes was at its peak in the 1890's, after which a decline in production resulted from the gradual depletion of the gravels. Following the introduction of extensive dredging operations in 1917, a brief revival of relatively high production resulted. Gold, however, has accounted for but 0.8 percent of the total value of metals recovered in the region.

Lead-Silver-Zinc Mining Begins

Meanwhile, in 1883 to 1885 the much more important lead-silver-zinc veins of the South Fork of the Coeur d'Alene River were first located. Their yields quickly surpassed those of the gold placers. During the feverish prospecting that followed, many of the more outstanding lode deposits were soon discovered. By 1890, therefore, properties with such currently familiar names as Bunker Hill & Sullivan, Hecla, Last Chance, Mammoth, Morning, Polaris, Poorman, Sunshine, and Tiger were located, and in most instances were being extensively worked. Previous to 1890, concentrates had been shipped to Helena, Mont., via a combined mule team, boat, and railroad route. In this year, railroads reached the region from the east and west. Most of the larger mines at this time had their own mills. The 1890's, however, were marred by costly strife between labor and management.

Top Place in U. S. Lead Production—1903

As is evident from Figure 2, lead production climbed rapidly as additional mines were opened. By 1903 the Coeur d'Alene region was first in the United States, contributing a third of its lead. Figure 2 also shows that the early silver output maintained a rather constant ratio to that



The Coeur d'Alene mining district, showing some of the more prominent mines. The currently busy Pine Creek district, a part of the Coeur d'Alenes, is immediately southwest of the concentration of mines near Kellogg: 1. Bunker Hill & Sullivan; 2. Caledonia; 3. Coeur d'Alene Mines; 4. Crown Point; 5. Dayrock; 6. Frisco (Federal Mining & Smelting Co.); 7. Gold Hunter; 8. Green Hill-Cleveland; 9. Hecla; 10. Hercules; 11. Hull Lease; 12. Interstate Callahan; 13. Last Chance; 14. Monarch; 15. Morning (Federal Mining & Smelting Co.); 16. Ontario; 17. Page (Federal Mining & Smelting Co.); 18. Polaris; 19. Sherman; 20. Snowstorm; 21. Star (Sullivan Mining Co.); 22. Senator Stewart; 23. Success; 24. Sunshine; 25. Tamarack; 26. Tiger-Poorman

of lead, with which it was intimately associated in the ores mined at that time. The Snowstorm mine, the only true copper mine in the Coeur d'Alenes, operated from 1903 to 1915. Its primary ore consisted of disseminated copper sulphides in a medium-grained quartzite. The rise in copper production subsequent to the first World War coincided with the increased activity in the Big Creek "Silver Belt," where argentiferous tetrahedrite ores, mined primarily for their silver content, yielded appreciable copper as well. The value of copper recovered in the Coeur d'Alenes up to 1944 represents but 1.8 percent of the aggregate value of metals from the region.

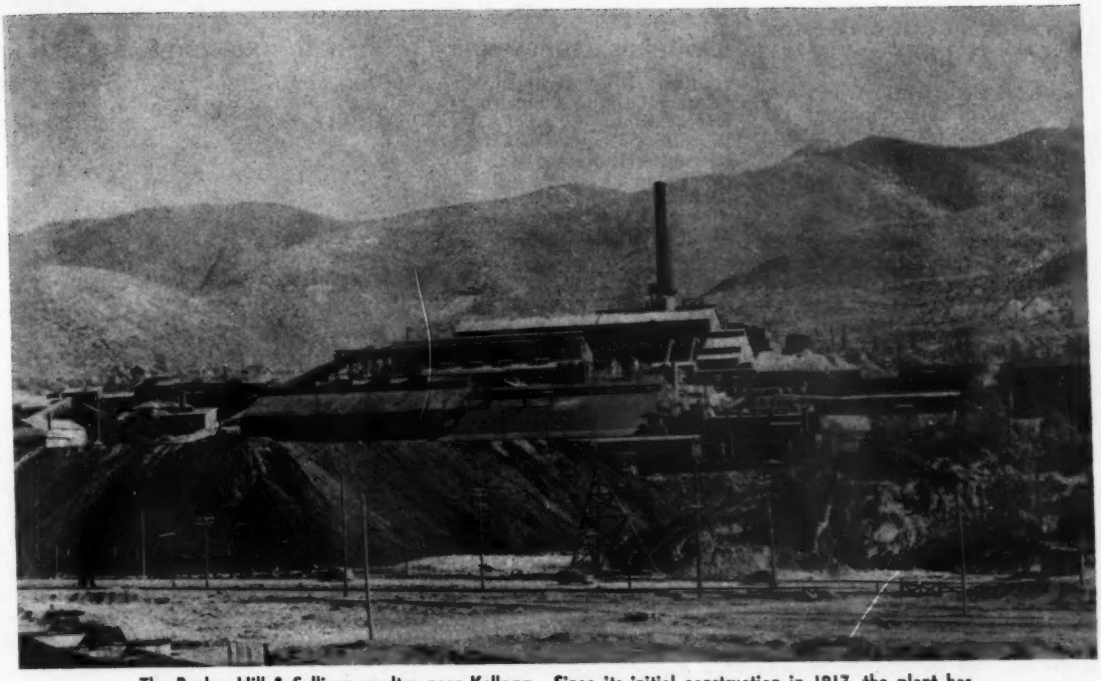
Flotation and World War I Change Zinc Picture

Zinc was first sold in the region in 1904, having previously incurred penalties at smelters. Shortly before the outbreak of World War I, flotation was introduced to the district. Its success materially increased zinc production, as did the increased demand and soaring prices of the war. Lead and zinc deposits of the Coeur d'Alenes range from a type rich in argentiferous galena and poor in sphalerite content to deposits rich in sphalerite and correspondingly lean in galena. Thus the need for additional zinc opened the way to mining at properties previously neglected. The large zinc ore bodies of the Interstate-Callahan in the Nine-Mile Creek section were first exploited in 1913. The war also increased activity in the Beaver Creek and Pine Creek districts. As the established mines of the region reached greater depths, they were found to have additional large ore bodies of lead, silver, and zinc. Metal production reached an unsurpassed peak in 1917, when the recovered metals had a gross value of $50,154,297.

Bunker Hill and Sullivan Developments

Previous to the first World War, little smelting had been undertaken in the Coeur d'Alenes. In 1917 Bunker Hill & Sullivan constructed a plant near Kellogg which has since dominated the smelting industry of the district. A maximum of 68,000 short tons of lead per year has been produced at this smelter.

In 1921 an 8,000-ft. crosscut was started from the Hecla mine at Burke southward towards the Star mine ore body. When this work was completed in 1925, the anticipated ore was encountered about 3,800 ft. below the surface. The extensive development work which followed satisfied operators that a huge tonnage of zinc-lead ore was available. The Star mine was owned by the Sullivan Mining Company, a subsidiary of the Bunker Hill & Sullivan and Hecla mining companies. The Sullivan company in 1926 began building at Kellogg an electrolytic zinc plant, primarily intended for the treatment of the Star ore. Since its initial construction, costing $3,050,000, this plant has been enlarged to a capacity of 350 tons of slab zinc and 3,600 lb. of cadmium per month.



The Bunker Hill & Sullivan smelter near Kellogg. Since its initial construction in 1917, the plant has played a leading role in the mineral industry of the region. At capacity, it produces 136,000,000 lbs. of lead per year

Sunshine—Largest and richest silver mine in the United States. Up to the close of 1941, since which time no production figures have been available because of war censorship, the mine had produced 82,949,337 ounces of silver; 15,856,053 lb. of lead; 21,375,470 lb. of copper and 17,142,691 lb. of antimony

Silver Belt and the Chester Lode

The period since World War I also saw the rise in importance of the "Silver Belt" at Big Creek, a mining section once considered relatively unpromising. In this district, the Sunshine silver mine had for years paid its own way with difficulty. As operations acquired depth, however, greater quantities of ore were located. By 1930, the Sunshine mine had moved to first place among Idaho's silver mines, and in 1937 it assumed first position in the United States. During this time of expansion, prominence was also acquired by other Big Creek enterprises. An argentiferous tetrahedrite, valued chiefly for its silver content, has been the most important mineral of the Big Creek ores. This is in notable contrast to the rest of the Coeur d'Alenes, where ores are mined principally for their lead and zinc sulphides. A new phase in the history of mining at Silver Belt properties was entered into as a result of prospecting at depth in 1943. This work disclosed a very extensive lead-silver ore body on the Chester structure. Due to its high lead content, the new ore has a greater resemblance to the usual Coeur d'Alene ores than to those previously known in the Silver Belt. Because of the war-time stress on lead rather than silver production, operators began mining the new ore immediately. Rights to the Chester lode are jointly shared by several companies, including the Sunshine, which is mining the new ore body on behalf of the group.

Labor in Short Supply Retards Production

In general, efforts of Coeur d'Alene operators to increase metals production during the present war have been seriously impaired by a shortage of labor. To supplement ore now being mined, several companies have turned to tailings piles. In addition, a million-dollar zinc fuming plant has been built at Kellogg to treat accumulated and current slag. A preliminary estimate of the region's metal production covering the first nine months of 1944 has been furnished the writer by Paul Luff, statistician of the U. S. Bureau of Mines. The recovered metals are estimated as follows: lead, 118,000,000 lb.; silver, 6,750,000 oz.; zinc, 108,000,000 lb.; copper, 2,260,000 lb.; and gold, 2,560 oz.

Antimony and Cadmium

Other than lead, silver, zinc, copper, and gold, which are discussed above, antimony is the principal additional metal recovered in the region. Some of the metal has been produced from stibnite, but the bulk of production has been relatively recent, from the Silver Belt's tetrahedrite. From this mineral, two plants in the Coeur d'Alenes are now equipped to produce high-grade electrolytic antimony. Production figures for the metal are not available, but it is known that, from Sunshine ores, 17,142,691 lb. of the metal were recovered at the Bunker Hill & Sullivan smelter previous to 1942.† Cadmium is produced extensively as a by-product of the zinc ores. Small quantities of tungsten were mined during the first World War, but no recent production of this metal is on record.

Mining operations in the Coeur d'Alenes are now deepest at the Sunshine mine, 1,000 ft. below sea level. The largest mine in the district, the Bunker Hill & Sullivan lead-silver-zinc mine, is worked to a depth of 400 ft. below sea level, or a maximum of 4,000 ft. vertically below the outcrop. With the new hoisting equipment now being installed, operations can be extended at least 1,200 ft. deeper.

DIVIDENDS PAID BY COEUR D'ALENE MINING COMPANIES—1886-1944

*Bunker Hill & Sullivan Mining & Concentrating Co.	$59,241,241
*Federal Mining & Smelting Co. (all holdings)	30,240,880
*Hecla Mining Co.	28,155,000
*Sunshine Mining Co.	24,535,771
Hercules Mining Co.	21,543,622
Consolidated Instate-Callahan	7,721,689
Caledonia Mining Co.	4,923,129
Green Hill Cleveland Co.	2,951,877
Senator Stewart	2,692,747
*Tamarack & Custer Consolidated Mining Co.	2,642,123
Snowstorm Mining Co.	1,457,647
Success Mining Co.	1,267,894
*Polaris Mining Co.	940,000
*Sherman Lead Co.	595,350
Coeur d'Alene Mines Corp.	550,057
Gold Hunter Mines, Inc.	521,074
Yukon Gold Company (Murray)	500,000
Ontario	394,877
Dayrock Mining Co.	341,497
Star Mining Co.	250,000
Sullivan Mining Co.	174,482
Sidney (company and leasing company)	173,685
*Highland-Surprise Consolidated Mining Co.	123,704
Crown Point	102,000
Golconda Lead Mines	80,000
Black Cloud	71,889
Jack Waite Consolidated Mining Co.	41,316
Marsh Mining Co.	40,000
Douglas Mining Co., Ltd.	38,407
Humming Bird Mining Co.	34,096
*Silver Dollar Mining Co.	20,000
Big Creek Leasing Co.	5,000
Leasers and companies not listed (estimated)	500,000
Grand total	$192,871,054

* Denotes companies which paid dividends in 1944.

This table, prepared by the *Wallace Miner*, lists dividends paid by Coeur d'Alene mining companies. As far as possible, it is complete for the years 1886-1944, inclusive. The list does not include records of personal and partnership profits in small operations, principally in placer mining in the Murray district.

Acknowledgments

In this report, production statistics not credited elsewhere are from the "Minerals Yearbooks" of the U. S. Bureau of Mines. Annual state reports on the "Mining Industry of Idaho" were extensively referred to. The assistance of the following is gratefully acknowledged: H. W. Ingalls, editor of the *Wallace Miner;* Paul Luff, Salt Lake City Section, U. S. Bureau of Mines; Arthur Campbell, Mine Inspector for the State of Idaho; and members of the staff at Bunker Hill & Sullivan Mining and Concentrating Company.

† H. W. Ingalls, *Compressed Air Magazines*, Oct., 1944, p. 251.

Looks Ahead

AMERICAN MINING CONGRESS

New ideas, new machine designs and new materials will result in improved standards of management, engineering, operation and safety.

By Edwin H. Johnson
Chief Engineer of Mines, Republic Steel Corporation

UNDER pressure of war needs, machine methods of mining have been adopted very rapidly, having been limited only by the manufacturing capacity of machine builders. Emphasis has been focussed on tonnage and no effort has been spared by management to produce an extra ton. Much of this production has been inefficient by our standards of comparison before the war. During this war period mine management has been badgered by demand for ever increasing production, by difficulty of getting supplies and repair parts, by loss of the cream of the workmen to the Armed Services, by inefficient and inadequate maintenance, by strikes and by endless regulation. But this period of stress has high lighted the needs of the industry and at the same time aroused the ingenuity of management and manufacturers.

Management Must Meet Market Competition

Perhaps it may not be unfair to say that cost consciousness has been a war casualty in mines, at least for the time being. High production of itself tends to obscure some of the inefficiencies that otherwise would demand attention. But management knows that these exist and plans to attack them as soon as the urge for output slackens off. It knows that the mines that survive in competition for markets that will inevitably be restricted, will be those with high man tonnage and high quality of output. No one expects wages to return to prewar levels and no one expects high prices to carry the load under restricted output. Therefore there is considerable uneasiness about the future of mining and a determination to look for better answers in methods, equipment and routine.

The manufacturers have been pressed to keep up with supply parts and new equipment demand, while being burdened with shortages of material and manpower. But they too have been looking toward the future. Perhaps very soon the demand for extra production will recede and with it the volume that has sustained the backlog of supply and equipment orders. This presents the challenge they have seen in the future for the development of new machines, sufficiently ahead of their own earlier manufacture, to render the old machines obsolete. And the end of the war will find them ready with ideas that have been in the development mill, unable to get out because of war time restrictions on new types of equipment.

So long as a very substantial percentage of underground output in any field was loaded by hand, the price of coal in that market was determined by the price that would support a well run mine that was not mechanized. So the mechanical mine with a higher man tonnage obtained an economic advantage with even a fair degree of operating efficiency. In a great many cases this natural advantage has caused the management of these properties to become too easily satisfied with a performance far below the capacity of their men and their machines.

Such managements are due for a rude awakening. After the war it is not going to be possible for sunshine superintendents and sandbox foremen to depend upon machinery to replace lack of skill in management and overcome laxity in engi-

neering. When the miners that are now on the other side of the world return to reclaim their jobs many of them are going to bring back a new perspective which will put new life and energy into their work and develop a new intolerance of worn out traditions and make-shift practices. Thus the future of mining will find itself dominated by forward looking management, revitalized miners and a manufacturing industry equally alert and prepared.

Comfort and Safety for Machine Operators

We see for the future the improvement of standards of safety, of organization, of engineering, of maintenance, of routine, of quality and of cost. We also see new standards of machinery design and manufacture, and the emergence of the machine to do a complete job of mining. In the perennial problem of making mining a more desirable job it is certain that future machines must be designed to operate more easily, particularly with less physical effort for the machine operator. The easy operation of controls and the ready response of a machine to the will of the operator is one of the best means to promote safety. Some machines tire out an operator physically or mentally or both. The exasperation of mule-like response in a machine is an invitation to carelessness and that in turn is an invitation to an accident.

Some machines seem to invite short cuts, such as sumping a shortwall at high speed, using the controller instead of the brake, nipping instead of using the trolley pole; and the like. It should be the aim of manufacturer and of management to develop machines that operate most easily the right and safe way instead of inviting the dangerous short cuts.

It must be remembered that more tons can be expected, not from faster or harder effort by the operator, but by making the operator's work easier, more comfortable and more attractive. The miners' distrust of automatic controls in many cases stems from the fact that there is too much "gingerbread" in them, by which he means that they were probably designed for stationary operation and not for the shocks and vibration of mining service. If a chunk of sponge rubber is useful on a draftsman's stool, why should a motorman or shuttle car operator sit all day on an oak plank or its equivalent? Some shuttle car operators are now suffering from jeepitis.

Track mounted mechanical loader working under ideal seam conditions

Machines Designed for Easy Maintenance

One certain future trend of mining methods will be to supply something close to rated voltage to the motor terminals. For many mines which now have adequate power, it would be unfair to state this as a future trend, but a surprising percentage of otherwise well run mines check their voltage when there is no load on the section and operate machinery at snail's pace under load. Copper for feeders and bonds will not be so hard to get after a while and this will be true of sub-stations too.

In this war mining situation perhaps the saddest letdown is in maintenance. Nowadays a spare machine is not an operating accessory but surplus. That means that we run the spare machine too until it stops, then patch it up to run a while longer. No one now will argue against the desirability of spare machines which can be overhauled in turn, so that all machines can be kept in shape to give dependable service. Most men who have had experience in mechanization agree with this principle and have well considered plans developed for organization of maintenance. Just now we are all troubled for lack of spares and lack of adequate maintenance crews, but we can take care of that with a breathing spell when we get some good men back.

We shall find another shortage then. Most of us do not have proper shop facilities near enough to the working area, and most of our care of replacement parts in underground shops is rather negligent. Here is one place the manufacturer is ready to cooperate in modern machinery design. He is building machinery now in group assemblies. Instead of tearing out a set of gearing piece by piece to replace a bearing or a shaft

Low coal is mined efficiently with tractor loading machine

Please turn to Page 64

Auxiliary airshafts, accurate surveys and measurements, separate main haulage splits, permanent airways maintained by treated timbering and roof sealing, are seen as future aids to improved mine ventilation.

By G. M. Rigg

Assistant Manager and Chief Engineer, Weirton Coal Company

THE primary objective in ventilating any coal mine is to provide an adequate quantity of fresh air at the working faces at all times, under positive control and with the minimum cost. During recent years there have been marked improvements in equipment and installation methods that have gone a long way toward this objective, although certain new factors have been developing gradually, including increased mechanization and the mining of thinner seams, that have made the problems involved more complex. The introduction of these new factors into the ventilation problem calls for more careful planning and improved operating practice.

There is a definite trend for mining companies, that are projecting new operations, to assure effective ventilation of their mines by providing a soundly engineered ventilation plan and by making periodic surveys to determine that the plan is being maintained and is functioning efficiently.

Splitting and Distribution

In mechanized mining the rapid development of entries generally produces a higher rate of gas emission which requires an increased volume of air at the working faces. To meet this requirement, it has been advocated that a superabundance of air be supplied. With this condition leakage will be relatively unimportant, and the increased power cost for furnishing the volume of air needed will be more than offset by the reduced number of doors and line brattices required.

Consideration has been given by some companies toward establishing a separate split of air to be used entirely for the main haulage, and in a few mines this is already being put into practice. At least one of these mines will have an independent fan to ventilate this split thus making it totally independent of the balance of the ventilating system. By establishing a separate split for the haulage, the hazard of smoke and fumes sweeping over the working faces in case of fire on the main haulage can be entirely eliminated, or at least safely controlled. This idea could be adapted to some present mines and could be provided for in the projection of many new mines. In view of the recent increased frequency of mine fires, many of which were on the main haulage, it is certain that there will be considerable thought and discussion given to this development.

The practice of providing permanent bleeders around the main panels in gaseous mines where pillars are being pulled has been steadily increasing. In mines where pillaring is not done, there has been a growing tendency toward sealing off worked out panels with stoppings or concrete bulkheads. This is particularly true of the Middle West field where sealing mined areas has become customary.

Air Surveys and Measurements

Efficient ventilating units are readily obtainable for a given duty, but the fact that the actual losses in the distribution system are usually larger than the combined losses in the fan installation proper is not generally considered. Increasing attention will be given to ventilation surveys in order to reduce to the minimum the loss of pressure and volume in the distributing system.

More emphasis will be placed upon the importance of accurate pressure-quantity surveys by the altimeter or inclined manometer methods to determine the unit values of an existing system. These surveys show the rate of pressure drop between various observation points along a circuit, and determine areas where there is excessive resistance. Indicated by these surveys is the economic feasibility of correcting deficient conditions by cleaning airways, driving additional entries, or modifying existing facilities.

Greater accuracy in the measurement of air volumes by the mine personnel would be well justified, and studies are now being made by the Ventilation Committee of the American Mining Congress on ways and means of improving accuracy. A report was made on this subject which was published in the April issue of the Mining Congress Journal.

Auxiliary Openings

More attention may be expected to be given to providing relief openings and to the use of multiple fans when mining areas develop beyond the limits of the initial fan installation. In cases of unavoidably large volumes or high resistance caused by a necessary single fan installation, consideration will be given to the use of modern high-speed fans in tandem.

Whenever new shaft installations are made there has been a marked

tendency toward installing fireproof lining. It has also been noted that in recent years there has been a smaller percentage of two compartment shafts constructed. The present trend is toward single compartment shafts and one-way travel of the air current to reduce resistance and lower power costs.

In providing auxiliary shafts it can be expected that increasing use will be made of the practice of drilling a pilot bore hole large enough in size (8" to 16" dia.) to dispose of material excavated during the shaft sinking. This method, which can be used only where the mine workings have been developed underneath, offers the possibility of a faster, cheaper, and safer shaft sinking operation. Ventilating and draining the shaft is simpler than in orthodox practice. In addition the pilot hole discloses information on the strata encountered that aids in deciding whether pre-grouting is necessary, and, where lining is required, the type that would be most satisfactory.

Aiding ventilation in the working territories by means of large diameter bore holes is a problem that is receiving considerable favorable discussion. The effective size range of these holes has not been definitely established but should probably be from 18"to 36" diameter, or larger. The present drawbacks to this scheme are the high cost of drilling, which may be lowered as equipment and practice are developed, and the fact that some strata encountered might require support which would add to the overall cost. Drilling a bore hole to the coal seam and placing a vacuum pump at the top of the hole to extract as much gas as possible from the strata in advance of the development work has been tried, but the results so far have not been entirely conclusive. Drilling long horizontal holes in advance of the working faces has also been suggested as another means of accomplishing the same result. (A discussion of pre-drilling is given in another article in this issue.)

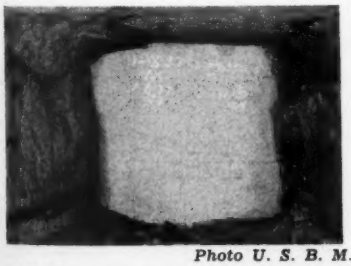


Photo U. S. B. M.

Well constructed air tight brattices will lower ventilation costs

Auxiliary Fans

It has been recently estimated that approximately twenty percent of the coal mines in the country are now using auxiliary fans and tubing to supplement their primary ventilating system. As more attention is devoted to positive control and proper distribution of air to the working faces there should be less need for this type of equipment and there should be a gradual decrease in its use.

However, blower fans and tubing are well adapted for a limited number of uses including the working of pitching seams, certain kinds of entry driving, rock tunnel work, and other similar conditions. When properly installed, maintained, and operated in accordance with sound, long-established principles, blowers are relatively as safe as any other piece of mining machinery.

Maintenance of Airways

Entries are ordinarily driven wider in mechanized than in hand mining where equal natural conditions exist, and as a result inferior airways are found unless improved timbering is provided. Permanent timbering should be considered for all long life airways, which are apt to be neglected. In some instances the providing of support at intersections in the form of treated posts or cribs is all that is required for airways and bleeders. The need for protecting air courses will become greater as mining progresses into thinner seams where the mines will usually develop lower air capacity factors and will require better maintained airways.

Guniting will continue to be used in certain fields where it is adaptable because it provides permanent, low-resistance lining. It is generally used for protection to main line haulageways and other similar uses, but because of its comparatively high cost is seldom used solely for airways.

Air conditioning of intake mine air during summer months to prevent roof and rib scaling has been used for many years in certain mines and, while it has definite limitations of use, it has proven decidedly satisfactory where installed and will continue to be developed and used where conditions indicate its need.

Roof sealing by means of protective paint or other similar sealing agent is a field that is being studied carefully and while it has not been developed fully to date, it does offer possibilities of relatively inexpensive protection for certain conditions.

COAL MINING *Looks Ahead*

Ventilation Equipment

The development of the modern axial-flow fan has benefited not only the large operators by its better overall efficiency when compared with the centrifugal-type fan, but has also provided the opportunity for the smaller operators to have an efficient, modern ventilator for their mines at a cost that they can afford.

While it is theoretically possible to obtain further efficiency improvements in this type fan by added refinements such as blade polishing, or adapting fans of lower design capacity, there is little to be gained through these means. Further improvements that can be expected include better drives such as V-belts, or flat belts, with steel cords. V-belt drives with steel cords are more likely to stay matched, and as the horsepower intensity per belt is materially increased, this will result in narrower drives.

There is an increasing tendency toward providing standby ventilating units that range from complete duplicate fan and drive for large capacity mines in gaseous coal seams, down to a spare motor for smaller non-gaseous operations. Included in this grouping is the increasing practice of some mines to provide two different sources of power for the fan drive, such as an electric motor and a gasoline engine, arranged so they can be quickly changed.

The practice of providing fan bearing thermostats as a precaution against bearing failure in propeller-type fans with consequent possible destruction of the fan rotor is also gaining wider favor.

Fan stoppage signalling devices are being installed with most new equipment, both the audible and the blinker types. It is highly desirable to have both type signals installed on all fans and the cost is relatively small for the protection gained.

Another practice that is being given much thought is the use of substation outage devices that are actuated by fan stoppage and which cut the power feeding into the mine immediately. The need for such devices is especially apparent for gaseous mines, and there are several methods by which this can be accomplished, generally based on the loss of air pressure or velocity.

Modern industrial lighting applied underground will decrease accidents and prevent present wastes in labor and material.

By Howard N. Eavenson
Consulting Engineer

SINCE mining first began one of its main problems has been supplying to the worker at the face adequate and safe illumination. While means of lighting have been greatly changed over the centuries and the present day miner has lamps unheard of and an amount of illumination many times greater than existed only a few years ago, the problem is still only in the process of being solved and the final answer has not been found. It is not the intention of this article to consider the historical phase of the problem but only to offer some suggestions for improvement in the future, and those only for coal mines.

Face lighting of coal mines is very difficult because of the nature of the substance itself as tests have shown that the average reflecting power of coal in place varies from about 5% to 10%. The reflecting power of timber and the roof are much greater than this, and in well rock-dusted places it may be from 50% to 60%. How much light is needed at the coal face?

Industrial plants have 2 foot candles in corridors, stairways and such places; about 5 foot candles in charging floors of foundries and boiler, coal and ash handling rooms of power plants—and very much more than this amount—from 20 to 50 foot candles where particular operations are being done. Considering that most of the operations done by a miner are under roof requiring close supervision, and that much cleaning of coal is done at the face—and always will be—a requirement of at least 5 to 10 foot candles is reasonable for the entire face and at least 20 foot candles when preparing for shooting, cleaning coal or operating machinery of any sort.

While fortunately this country's experience with the darkness of black-outs has been trifling, in England the night black-out was universal for more than five years, the conditions in town and country approximating those underground without lights, and many people understood for the first time what is the daily experience of underground workers. The results of underground darkness were recently well expressed in the presidential address of Mr. H. W. Smith, of the Midland Institute of Mining Engineers, as follows:

> "1. The efficiency and safety of every person, mobile machine and horse is largely governed or affected by the degree of light in which they work.
>
> 2. The general obscurity in which practically all operations are carried on is such that if it were possible 'by taking the lid off the mine' to obtain a view of the state of affairs existing in the workings, there would be exposed a great wastage of time, effort and materials, which the darkness inevitably brings."

A reasonable standard of coal mine lighting would be 20 foot candles at shaft bottoms, side tracks and places where cars are handled continually, 5 foot candles along all haulage roads in use, and 20 foot candles at the working faces when work is being done there. While the latest electric cap lamps can furnish illumination over very small areas approximating these intensities, no

portable lamp can possibly light the entire face of any place, as it must be, if the work done there is to be under equal conditions to those industry thinks nothing of supplying in all factories.

To provide such lighting the lamps must be safe and such that no gas can be ignited in case of breakage, they must have sturdy filaments that will not break with shocks from shooting, they must be free from glare, and arranged so that their positions can easily be changed as the face advances; all wiring must be in insulated cables and sectionalized, and provided with ample switches to save current and facilities. Current should be provided from sources not being used by locomotives, and machines of all sorts, in order to insure reasonable voltage regulation, although this need not be as close as in city systems.

Some mines in this country have had haulageways and faces lighted from the trolley circuits, which was not entirely satisfactory, although far superior to the hand lamps then available. A few mines in England have experimented with "lighting from mains" and found there was a steady decrease in accident rates, the compensation cases falling from 6.5 to 1.5 per month; the saving in this respect alone was sufficient to pay the capital and running costs of the installation, less labor charges. Many German mines installed this type of lighting in the late twenties, and in some cases the production per man-shift increased from 1.87 tons to 2.32 tons, with the waste content reduced from 8.8% to 4.7% of the output hauled.

Methods of industrial and home lighting have improved greatly in the past few years and new types of lamps are available. Many of these will not be suitable for mine lighting, but now that the cost of lighting is all borne by the operators, it is time that a research into the best methods of properly lighting our mines be started by the electrical industry, both power companies and equipment makers, and the coal industry. This would not be expensive and the possible savings are many times the cost. While predictions are necessarily uncertain, it is the writer's opinion that coal mines properly and adequately lighted will reach standards of safety and production efficiency hitherto unknown, at a lower cost than now possible and with labor satisfaction now unknown.

Close clearance operations should have more illumination

Flood lighting of the face will offer many advantages over spot lighting

In machine maintenance, better illumination is needed for proper inspection and repairs

Improvements in equipment and practices for drilling, blasting, cleaning kerf and face illumination will give higher operating efficiency and a better product for market.

By James Hyslop
Vice President
Hanna Coal Company

PROGRESS in the art of face preparation, during the next few years will probably develop at a rapid pace. This prediction is based on three considerations—first, war conditions have hindered experimentation with new procedures and the development of new equipment. In the meantime ideas have been accumulating in the minds of operating men, engineers and manufacturers and, it is reasonable to expect, therefore, that the end of the war conditions will release this pent-up inventive energy. Second, it is probable that a manpower shortage is going to continue in the coal industry after the war and that management will be compelled to seek more efficient ways and means of getting the work done in order to meet this difficulty. Third, high labor costs that have developed, during the war period, again places the industry in a position where it must fight for its very existence by attempting to meet the competition provided by other fuels.

Improved Loadability

Loadability will come in for its share of attention. Loading machine maintenance is one of the largest items of production cost; wear and tear on the loading machine is affected very greatly by the loadability of the coal and, if the loader is required to do a great deal of digging, the cost of its maintenance will be very high. This is probably the most important face preparation problem and affords the best opportunity for progress. Larger mine cars and improved haulage service are rapidly reducing the car change factor in the loading cycle. This, of course, also tends to focus attention on the efficiency with which the machine can pick up the coal.

One of the factors affecting loadability that will come in for attention is that of bugdusting the undercut. This job is regarded by management and labor alike as a necessary nuisance, with the result that it is seldom carried out in an efficient and effective manner. It is to be expected that future cutting machines will be equipped to clean out the undercut effectively; this idea has been experimented with for many years and it is possible that someone will come up with the answer before long. Top cutting tends to minimize the bugdusting nuisance and also tends to reduce roof control problems. Much experimentation along this line has been done recently; already quite a number of mines have standardized on top cutting and tractor machines are now available which make this practice feasible in conveyor mining. All of this indicates that there will be a marked increase in the practice of top cutting.

Traveling Drills

Important developments in drilling and blasting may be expected. The power applied to hand-held and post-mounted drills has been limited by the weight permissible for manual handling. Older designs of self-propelled mounted drilling machines have been too cumbersome and expensive. Recent developments point to the probability of the adoption of designs less cumbersome than the older track-mounted drill and more automatic, powerful and speedier than the hand-held, or post-mounted machine. Such new drilling machines will be self-propelled in both track-mounted and rubber tired designs; they may be hydraulically or pneumatically driven rather than by electric motor; they will have high maneuverability which will enable them to drill in any part of the seam and at almost any angle and where top cutting is practiced, they will, of course, be able to drill very close to the bottom. In many mines drilling represents a serious production bottleneck and there has been a crying need for a solution to the problem for many years. The subject is getting a great deal more attention than it has received in the past from manufacturers and operating men alike and it seems quite certain that a decided step forward may be expected soon.

Explosives and Blasting Practices

The perfect and fully satisfactory blasting method has not yet been developed. It may not be too far fetched to hope that explosive manufacturers will have learned many things during the war which may be applied to coal blasting as the industry needs a permissible explosive which will have all of the advantages of black powder, and none of its hazards.

Some system of safe multiple shooting is needed. The practice of firing one shot at a time, in many cases, necessitates that the shot-firer is exposed to hazards resulting from going back to the face under blast-weakened roof. Furthermore the time consumed in firing single shots is objectionable and more effective use of explosives and improved loadability would result from firing shots simultaneously.

It has always seemed to me that among the substitutes for explosives, compressed air shooting held the greatest promise. Steady progress

has been made in the development of this method of breaking down coal and a more wide-spread use of improved air blasting equipment would seem to be a likely development.

Related to the problem of blasting is the fact that the trend is going to be away from the necessity of producing a maximum quantity of lump coal. Two things contribute to this: first, the increased use of industrial and domestic stoker equipment; second, the importance of producing low ash or low sulphur coal by feeding finer coal to the washing plant. This tendency will, of course, simplify the loadability problem.

Where drawslate or partings are a problem, the trend would seem to be toward loading everything together, if the materials are of such a character that they can be separated by a cleaning plant. It is highly desirable to eliminate tasks requiring heavy manual exertion and full seam loading will probably develop wherever this can be accomplished by eliminating hand work at the face, and doing the job by coal dressing equipment on the outside.

Timbering Methods and Materials

The items mentioned thus far have all been related to facilitating the performance of the loading machine at the face. Improved efficiency here, however, is going to require that special attention be given to improving the efficiency of the other tasks that must be done before the place is ready for the loader, such as track laying, road building, timbering, etc. Probably no other single factor affects the efficiency of mechanized mining to such an extent as does roof control at the face—particularly where roof conditions are bad.

At the present time most of the timbering tasks are accomplished manually, but there seems to be no reason why much of this job could not be done mechanically. Numerous experiments are being made with specially designed power operated timber trucks which carry the timbering supplies and raise the heavy steel, or wood crossbars into position by mechanical means. Such timbering trucks will, of course, be self-propelled in both rail and rubber tired applications. Enough experience has already been gained from the use of experimental machines to indicate that such equipment can be used very effectively and a wide acceptance of this type of equipment can be expected as soon as it becomes available.

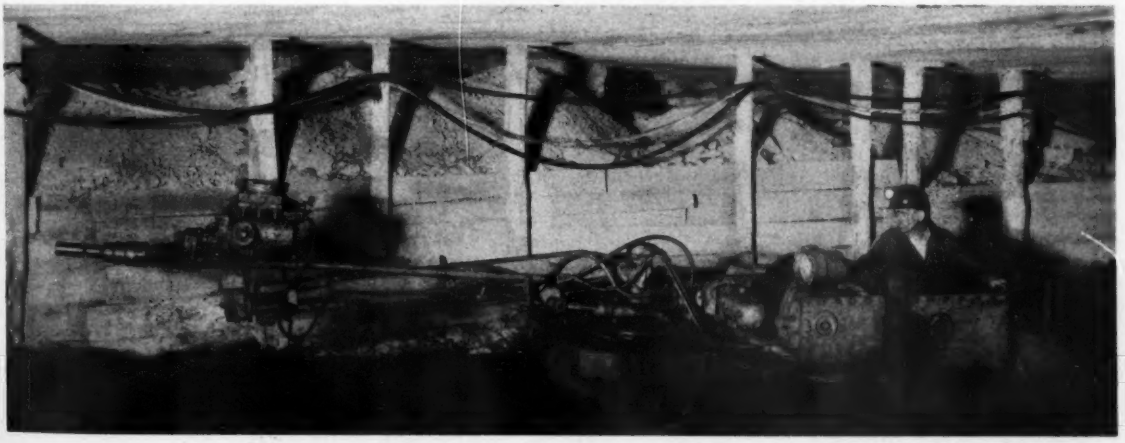
Timbering procedure will, no doubt, be further affected by a more wide-spread use of adjustable steel posts at the face and in some cases by the use of lightweight cross-bars. Much greater attention will be given to providing greater protection against roof accidents for the machine operators and the answer would seem to be in the use of steel, both for posts and beams.

Underground Illumination

Safety and efficiency at the face can be improved by more light. The control of dust at the face operations greatly simplifies the problem of providing adequate illumination. Machines of all types will be equipped with better lighting fixtures and the use of portable flood lights will probably develop in the future. Many experiments along these lines have been conducted, considerable progress has actually been made and the future is certain to bring better light to the working faces.

These and many other ideas are in the minds of the men who are responsible for producing the coal and those who design and manufacture the machines. The rapid progress which mechanized loading is making throughout the coal industry serves to concentrate the attention of a greater number of geniuses on the problems of progress. Interesting and effective developments are certain to come.

Hand operated jacks for setting mine timbers may largely be replaced by timbering machines



Mechanization eliminates the burden of handling, transporting and operating drill equipment

Growth of mechanized loading and extension of full seam mining will require larger cleaning units with improvements designed to eliminate waste in rejects. Briquets and smokeless fuel will be further developed to utilize fine coal.

D. H. Davis
Product Control Manager, Pittsburgh Coal Co.

LOOKING back over the past 10-15 years there has been a tremendous increase in the percentage of total production loaded mechanically, including both underground and stripping operations. If the recent trends in mechanization continue, at least 75 per cent of the total coal mined in the U. S. A. will be loaded mechanically within a few years. In view of this trend there will be by necessity an increase in the number of cleaning plants and many important changes in these plants and in their construction will result. Cleaning units will be designed to handle a greater tonnage and larger sizes of impurities; therefore, refuse elevators and conveyors will be constructed of sufficient capacity for any likely quantity of refuse that may have to be handled. Layouts should be prepared with the idea that additional cleaning units may be necessary in case of radical changes in mining procedure, whereby greater quantities of impurities would be present in the raw coal.

More consideration will be given to obtaining higher recoveries of coal from the seams because many mines producing high quality coal are approaching exhaustion. Where the reserves of high quality coals are limited, the mining methods adopted will be designed to obtain higher recovery. In a few cases it will mean that hand loading methods will be continued in order to maintain the recovery, but the general trend will be toward complete mechanical loading.

Full Seam Mining

In other instances, it will be found that greater recovery from the seam can be obtained by using mechanical loading, provided that the preparation plant can handle a greatly increased amount of refuse. Several mines have found it to be economically more advantageous to load one product underground making no attempt at separation of impurities at the working face, passing that part of face preparation job to the surface plant. With continued higher wage scales this trend will continue in order that a greater tonnage of coal per machine shift and per man shift underground will be produced. Therefore, "full seam" or "run-of-seam" mining, as it is often called, will become more common in the future and preparation plants will be designed to meet the difficult problems of material handling and coal cleaning.

In view of a raw product of higher impurity content, the top size of coal mechanically cleaned will be extended upward and in the near future will reach approximately 10 inch top size. Several plants are today cleaning up to 7 inches. Because of mechanical loading methods, there will be a reduction in the percentage of lump or block sizes, so that very little coal over 10 inch size will likely be present in a majority of cases. The flow sheet will then consist of crushing the mine run raw coal to pass 10 inches and the entire product will be mechanically cleaned. There will, however, be some necessity for hand picking of coal in the large sizes after cleaning, as often impurities of low gravity pass over into clean coal and must be removed manually because of their poor appearance.

Preparation of Two Grades

There will also be a tendency where the characteristics of the coal permit toward the cleaning of wider size ranges. However, it is unlikely that with any coal it would be desirable to clean from ⅛ inch to 10 inches in one cleaning unit, since coal under 2 inches is usually sold on its heat or analytical properties, while coal over two inches is sold on its visual appearance.

The need for greater recovery will be reflected in the selection of cleaning units. When large quantities of refuse are removed by the cleaning plant, the percentage of coal remaining in the refuse will constitute a greater proportion of the total product mined and cleaning units will be selected to produce the required quality with a minimum loss of merchantable coal in the refuse. For the past ten years on the European continent and in England there has been a trend towards the heavy-density or float-and-sink type of cleaning unit for cleaning coal over 10 mesh in size. This trend has spread to the U. S. A. and units using sand, galena, magnetite, or other such materials as a media will undoubtedly be in more common use in the future. These units have the advantage of cleaning at or near to a given gravity with a small loss of coal to refuse, thus increasing the recovery. With "full seam" mining practices impurity streaks and bone bands that formerly were gobbed underground, will be mined thus making the cleaning job more difficult. In many instances, two clean coal products of different analyses will be produced in order that a high recovery will be possible. By cleaning first at a low gravity, say 1.45 specific gravity, a low ash product will be obtained and following up with a separation at a higher gravity, say 1.65 specific gravity, a secondary coal or a steam coal of higher ash content will be obtained. The refuse from such a process will contain but a slight amount of coal values.

Air operated jigs and classifier and launder type of washers will continue to find application, in some instances in conjunction with heavy-density or float-and-sink type of cleaning units. The heavy-density units will also undoubtedly find increasingly greater application as a final clean-up unit before disposing of the refuse product, thus recovering the maximum percentage of coal.

Increased Demand for Stoker Coal

Small sizes of coal, particularly stoker grades, will be better prepared, both in respect to freedom of impurities and, also, in respect to screening and dustless treatment. A wider distribution in the use of stokers in residences is expected. The demand for coal under one inch and over ⅛ inch in size will be greatly increased. In order to meet this demand facilities will be arranged for crushing and rescreening the prepared grades of larger size. In relation to other grades the realization of the stoker grades will be higher than at present.

The production of greater tonnages of stoker grades will pose greater problems in the preparation, marketing, and utilization of fine coals produced as a result of preparing stoker grades. The utilization of the coal will determine largely the extent to which fine coal cleaning will be carried and the process of cleaning adopted. Wherever the required analyses of clean coal can be obtained by air cleaning, it will be adopted in preference to wet methods for cleaning of fine coal under ⅜ inch, particularly for steam use. Air cleaning is very limited in its cleaning effectiveness below 14 to 20 mesh and in its present stage of development will not be adopted where it is necessary to improve the analytical properties of the minus 14 or 20 mesh fraction. Air cleaning methods will unquestionably be improved in the future and dry separation processes depending on electrostatic, light reflection, and other properties will undoubtedly be developed.

Briquets and Smokeless Fuel

The art of fine coal cleaning by wet methods is well developed today and will be adopted wherever there is an economic need for cleaning of fine coal to high standards. Simplification of auxiliary equipment such as dewatering, thickening, filtering, etc., will certainly be accomplished. Froth flotation of slurry has also been developed for fine coal cleaning and where coals of low impurity are required flotation will be more widely adopted in the future. The necessity for cleaner fines will be chiefly in plants preparing coal for metallurgical coke, smokeless fuels, and special coals for chemical industries and undoubtedly in these special cases, cleaning of fine coal will be extended. It has already been shown that satisfactory smokeless fuel and briquets can be produced from fines under ⅛ inch and that there is a ready market. The development and extension of smokeless fuel and briquetting plants is a logical answer to the utilization of increased quantities of fine coal.

Dedusting and fine screening will be practiced to a greater extent than at present: first, to obtain a fine coal product for smokeless fuel and briquets; for this purpose the raw fines must be clean or the coal must be cleaned, possibly dried, and then dedusted; next, to remove part of the raw fines ahead of cleaning plants in order to reduce the slurry problem; third, for the removal of dry fines for shipment in special enclosed cars.

The laws are becoming more stringent in respect to contamination of streams with washery water and solids and this will necessitate the use of closed water circuits or circuits with a controlled wasting system. Water treatment and clarification methods will be developed and adopted to a greater degree than at present. New type filters and mechanical dryers will increase the recovery of slurry in a partially dewatered condition, which can thus be disposed of with refuse, or clean coal. Lower moistures in fine coal

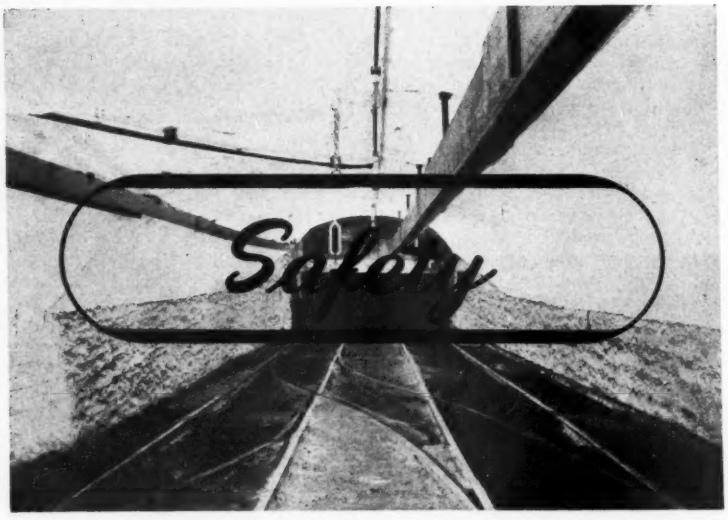
Clearing the kerf at the face makes a better product at the tipple

will also be obtained by the improved filtering and mechanical drying devices and by new developments in heat drying already in progress.

Uniformity in Analysis

Uniformity of product will be in demand in respect to analytical properties, size consist or screen percentages, oversize and undersize, and moisture content. Size consist of resultant sizes, say minus 2 inch,

(*Please turn to Page 57*)



Accident hazards resulting from the increased use of electric power and machines underground will be overcome by intensive safety training of supervisors and employees.

By Ernest B. Agee
Nemacolin, Penna.

THE future trends in mine safety methods is a matter of great importance to all coal mining men as these trends will, in one way or another, affect everyone: operating officials, manufacturers of mining equipment, company, state and federal inspectors, and, mine workers. We will not attempt to predict the future trends of all the operations in coal mines but will confine this article to a few of the more important developments that we feel will be "live" subjects of discussion wherever mining men get together.

The mechanization of coal mines in this country has increased by leaps and bounds during the past few years. Many improvements in machines, equipment and operating methods have been made in the interest of safety and the industry has invested huge sums of money for these improvements; however, the desired safety records have not yet been obtained and one task for the future is to discover the reasons why our accident frequency and severity rates are not improving more rapidly.

Mine safety methods and practices must not only keep abreast of the mechanization programs, but should be planned well ahead of all mechanical installations. The safe ways of doing things in coal mines are the right ways and must be established despite top speed production, confusion over wages and working conditions, and the difficulties experienced by foremen in enforcing safety rules and practices.

Training of Supervisors

A very important future factor in mine safety will be foremanship training. The Training Within Industry Service of the War Manpower Commission has been tried at many coal mines with varying degrees of success. Mechanical loading and the changing times have made it increasingly difficult to properly supervise and no matter how good a plan a company may have to reduce mine accidents, such a plan will not be effective unless enforced by the supervisory organization.

The successful enforcement of mine safety methods depends upon the qualities of the supervisor such as character, mining experience, industry, leadership, training, tact and the ability to adapt himself to changing conditions. Recognizing these qualities as being essential to good, safety supervision, the future will demonstrate clearly that a training within industry service program should be given in one form or another to the entire supervisory personnel. By proper selection of courses taught, a training program would help in the development of supervisors in some or all of the qualities desired.

Foremen have the primary responsibility of selling safety and putting any plan into efficient practice and enforcement and a man well trained and skilled in instructing, planning and leading will produce more coal efficiently, with a better accident record. We believe that the future will prove conclusively that the training of supervisors, particularly in the art of handling men, will pay many dividends and give gratifying results in safety, production and efficiency.

Mine Fires and Explosions

The prevention and control of mine fires and explosions will be given much serious study by mine officials and mine inspectors.

The most important single factor in the efficient production of coal in this country in recent years, has been the installation of electrically operated equipment and devices. With this rapidly increased use of electrical equipment, fires and explosions have increased correspondingly in the mines and in 1943 the coal mines of this country experienced eight mine disasters; six of these disasters were definitely attributed to electricity and resulted in 88 deaths. Unless fires and explosions, caused by electrical origin, are curbed, the coal industry must expect drastic regulation.

The many hazards of using electrically driven equipment in coal mines are not always recognized by mine officials and the technical methods for protecting such equipment is not always known by mine electricians. A program of education is therefore needed and periodic check-ups and surveys of electrical installations and equipment by qualified electrical engineers are becoming increasingly more important in coal mines. Power companies that furnish electricity to the mines are recognizing this trend and are assisting in the work by offering the services of trained electrical engineers to their customers. Also, manufacturers of electrically driven equipment, accessories, trailing cables, etc., are looking to the future and are devoting much time and research to electrical problems and hazards.

Protective grounding of metal frames of electrical equipment in the working sections is a trend for better safety. The electrical system in any coal mine should be sectionalized and controlled by circuit breakers in order to eliminate fires caused by short circuits. Rubber covered trailing cables cause many fires in coal mines, particularly in conveyor operations and management now realizes the fire hazard of worn and spliced trailing cables. While manufacturers have made some progress in the development of synthetic rubber and plastic insulation, the coal industry needs fireproof, flexible trailing cables badly.

Control of Mine Fires

The control of mine fires after occurrence is receiving the combined thoughts and efforts of mining officials and inspectors. Sprinkling systems for allaying dust at the faces, on haulways and at dumps are not new in coal mines and the circulating of water, through pipe lines, to the workings is being carefully studied at this time. The initial cost of installing such a system is greater than for mobile water tanks; however, experience proves that once the pipe lines are laid they are out of the way and do not interfere with haulage operations or handling of supplies.

An underground water system serves the double purpose of allaying dust and providing fire protection. Pipe lines, carrying an ample supply of water, with sufficient pressure, should be made available for fire fighting purposes in every coal mine. Water taps should be installed at each door, safety station, oil station and at intervals not exceeding 1,000 feet along the haulageways. Hose should be kept at each safety station and oil station in each working section, together with pipe wrenches, pipe fittings and adapters. Hose should be tested every six months. Widely separated central hose stations should be established and equipped in each mine; with booster pumps if necessary to maintain pressure.

A small fire extinguisher should be standard equipment on each mine locomotive, mining machine, loading machine, track drill and shuttle car. Larger (2½ gals.) capacity extinguishers should be placed at strategic locations throughout a mine. Brattice cloth, sacked rock dust and other emergency fire fighting equipment should also be made available. Supervisors and mine workers should be instructed on what to do, and how to do it quickly, in case a fire occurs. Fire fighting practice should be held in the sections at regular periods. A program of this kind might pay big dividends in the saving of life and property in coal mines.

Photo U. S. B. M.

A dust sprinkling system will furnish water for fire fighting

Fires Beyond Control

A short time ago a large mine experienced a fire near the shaft bottom which gained headway so rapidly that 146 men were trapped in by the source of the fire. Fortunately, a few years previous, a State Mine Inspector insisted that the company sink an escape shaft about three miles away from the hoisting shaft, for such an emergency. This was done. As a result of the foresight of this inspector and the cooperation of the company, 140 men were saved from certain death. Six men, who were working on the haulage near the origin of the fire, were suffocated when they attempted to escape through the fire area.

A future trend in mine safety methods to meet fire hazards will be the construction of escapeways to prevent the trapping of men underground. Working sections will be projected so that if an outby fire blocks escape by the haulageways and aircourses, an additional travel way is provided and known to all men working in that section. The increasing danger of loss of life and property because of fires in coal mines is a challenge to coal operators. This challenge must be met with foresight and action.

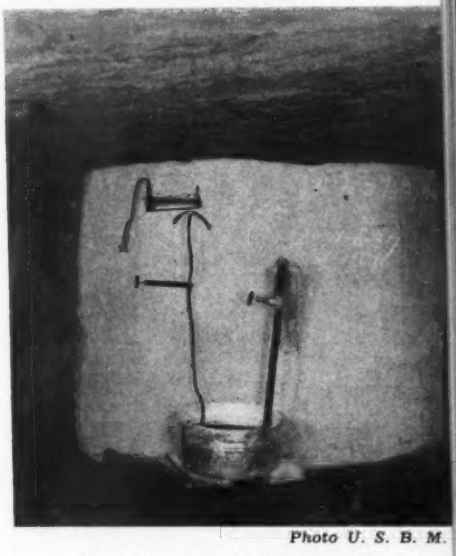


Photo U. S. B. M.

Mine fire seal with bleeder pipe

Man-Trip Cars

Another future trend in mine safety methods is evidenced by the introduction of man-trip cars—specially built and used only for that one purpose. These cars are rugged and so constructed that roof falls on the cars, or wrecks, cannot possibly cause injury to the workers traveling to and from the working places. Man-trips made up with such cars can travel 12, 15 and 18 miles per hour on well constructed haulage tracks, in comparison to the present customary travel speed of six miles per hour. At these higher speeds, the specially built cars would quickly pay for themselves by reducing the travel time, increasing the work time, and, at the same time decrease accidents to employees now riding man-trips made up with regular mine cars. This future trend in safety and economy should gain momentum rapidly.

In conclusion, we believe that these future trends in mine safety methods should be given serious consideration by all mine operators and officials in the industry who face the responsibility of reducing the loss of life and limb in the coal mines of this country.

Mining systems with locomotive, rope, and belt conveyor haulage are described as indicating the future trends which will develop improvements in operating these present types of equipment.

By E. H. Jenks
Chief Engineer
Rochester & Pittsburgh Coal Co.

HAULAGE has long been recognized as one of the key operations in coal mining and as underground mechanization increases, the mine production will become more and more dependent upon the performance of the haulage system. It is hardly probable that the future—at least the immediate future—will develop any new type of equipment and we may expect that the underground transportation will continue to be by locomotive, rope, or conveying belt. So perhaps the best forecast for main line haulage can be given by a resume of successful methods now in operation and repeating some general rules that have been learned by experience—predicting the future by the present but always keeping in mind that improvements and refinements will unquestionably be made.

Main line transportation may easily become the bottle-neck of a mine and as the cost of installation and of operation is small, compared with the total mine investment or total mine operating cost, the first general rule for main line practice whatever the equipment may be, is to make sure that it is adequate to handle even the possible peaks of production. Formerly haulage systems in a mine were divided into three classes, that is, main line, secondary and gathering; in many cases it is still so divided although the growing practice seems to be to extend the main line and eliminate secondary haulage entirely. Another trend is to make gathering haulage as short as possible, by gathering the coal as near as practicable to the working face and taking it, in one trip movement from there to the tipple.

Locomotive Haulage

Where the coal is high and the grades are, or can be made, not greater than an average of 4%, the main line haulage most easily adapted to all conditions is electric locomotives with mine cars. Then the main line is simply a matter of railroading with proper selection of locomotives, size of mine cars, track construction, location of sidetracks and passing tracks, power distribution, telephone system and trip dispatching as the principal problems. Locomotive size depends on the grades and the speed required, in any case the locomotives should be of sufficient weight to handle any train without using sand except to start and stop. Mine cars should be the largest that can be fitted into the mining system.

When track has a life of 10 years or more, 80 lb. rail, 6 in. x 8 in. ties three feet longer than track gauge, cinder ballast and welded joints will pay dividends. Track with a life of from two to ten years made up of 60 lb. rail, 5 in. x 7 in. ties, 2½ ft. longer than track gauge, bolted joints, welded bonds, using mine refuse for ballast, will give good service. Track to be used less than two years can hardly be classed as main line track but in any case the weight of rail and type of ties depend on the weight of equipment to be used on it. Good drainage is required to have a primary requisite for good track, therefore ditches must be made and maintained to keep water out of the road-bed.

Sidetracks should be located where coal is gathered and should be so constructed that a locomotive can land an empty trip and take away a loaded trip with no help from another crew. The location of passing tracks should be determined by time study with the advantage given to the train moving up the grade, that is, so that the locomotive with the hard haul will not have to stop. Except with the most unusually heavy traffic, main haulage lines with properly spaced passing tracks will keep locomotives properly spaced and generally give better results than complete double track.

Trolley wire should be lined and graded with the track and of sufficient size to stay up in place and to avoid sag from overheating. Feed lines should be carried with the trolley lines so that the voltage drop is never greater than 20%; where the voltage drop is more than 20% it is time to add feed lines or develop a new source of power.

A dependable telephone system is necessary to properly regulate the haulage and the phone wires should be strung in headings where they can be readily inspected and maintained. The dispatching system is of the utmost importance and dispatcher sheets should be so made up that the dispatcher can easily locate all cars in the mine; the number and location of loads and the number and location of empties available, as well as the location of each haulage unit.

Track Haulage in Lucerne Mine

Lucerne mine in the Central Pennsylvania Field is an example of through haulage from very close to the face to the tipple. It is a mine producing 4500 tons from a 6 ft. seam with all coal mechanically loaded. Main line locomotives

weigh 20 tons equipped with air brakes, mine cars are 9 ton capacity, 21 feet long, 6 ft. 6 in. wide and 44 inches high, built very much like railroad cars, that is, with two 4-wheel trucks, anti-fraction bearings and automatic couplers. Track is 42 in. gauge; the first three miles are 80 lb. rail, 6 in. x 8 in. x 6 ft. 6 in. ties, welded joints, cinder ballast and the flat headings have 60 lb. rail, 5 in. x 7 in. x 6 ft. ties, bolted joints, welded bonds and mine refuse for ballast. Trolley wire is No. 9 section, with feed lines as required to keep voltage to a minimum of 450 volts, four sub-stations are located at various points over the mine as sources of power.

Telephones are located at each loading point, at each passing track and at the tipple, and telephone lines are installed on the haulage heading. The dispatcher is stationed centrally in the mine and all locomotives move on dispatcher's orders. No attempt is made to schedule trips and the system is flexible so that cars can be diverted from one section of the mine which may be in trouble to a section which can produce big tonnage. The track in the production headings is a loop off the main line, and there is no secondary haulage. The main line locomotive pulls the empty trip past the production heading, backs the cars up into the loading point, coupling onto any empties which are not loaded, then goes to the other side of the loop, picks up the loads and takes them directly to the tipple. Coal is loaded into the mine cars from rubber-tired shuttle cars and their loading station is never farther than 700 feet from the working face.

Rope Haulage

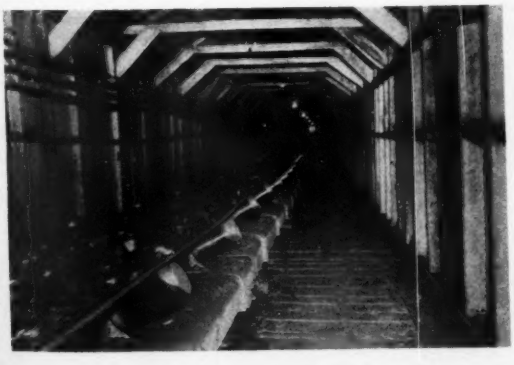
Rope haulage is justified on a comparatively long haul where the grades are steeper than the economical limits of locomotive haulage. Where practical it is desirable to drive the main heading to the greatest dip and drive the secondary headings on a comparatively flat grade from the main dip heading. Selection of a hoist depends on mine capacity, grades and length of haul, the simplest and most common hoist is a single drum type where empties can be dropped in by gravity on a straight haul road. The rope should be of sufficient size to allow a liberal factor of safety including a reasonable amount of wear on the rope.

Track for rope haulage is not as hard to maintain as that for locomotive service, therefore what is generally considered second class track for locomotives will usually be satisfactory for rope haulage. Changes in grade for rope haulage should be made with vertical curves with a liberal radius to avoid undue wear on the rollers at the grade changes. Rubber covered steel rollers with anti-friction bearings work out very well on uniform grades but it is generally necessary to use chilled surface steel rollers at grade changes. Wood rollers spaced about one in every fifteen will help to properly train a new rope.

Sidetracks or landings for rope haulage should be so arranged that empty trips can be dropped in and loads picked up with a minimum delay for rope change from the empty to the loaded trips. With good track and a proper instrument panel in the hoist house to keep the engineer accurately informed of the trip location, it is not necessary to use a trip rider.

An Operation With Rope Haulage

The Waterman Mine operating in the Central Pennsylvania Field produces 3000 tons of coal in two shifts and is an example of a combination of rope, locomotive and belt haulage. The seam averages 44 inches in height and pitches at an average grade of 8% against the loads. The main heading is driven down the heaviest pitch, the flat headings are driven right and left so that there is a slight grade in favor of the loads. The production or room headings are driven up the pitch a distance of 2000 feet and rooms are driven right and left off the production headings.



Belt conveying first used in slopes and tipple approaches has been extended to main haulage service

The rope haul is 8,000 feet long with no curves except at the landings and operated with a single drum hoist driven by a 300 HP motor of the regenerative type. Empties are dropped in by gravity and the loads pulled out to a point where they can be dropped into the tipple. All track in the mine is 60 lb. rail on 5 in. x 7 in. x 6 ft. creosoted ties; the rope road has welded joints and the flat road bolted joints with welded bonds. Sidetracks are located at each production heading so that 20-ton locomotives can place empty trips and pull loaded trips with no delay to the loading. Mine cars are of 10-ton capacity of the railroad type. Belt conveyors are used in the production headings; these are the semi-stationary type using 30 in. belting, loaded by shuttle cars and discharging directly into mine cars.

Belt Conveyors

Belt haulage is the least flexible for mine use and must be supplemented with other types of haulage to handle equipment and supplies. However belts are adaptable and efficient for special conditions of main line haulage as for example; a comparatively short, steep slope, that is up to about 2500 feet in length and 14 to 18 degree pitch, hauling from a dump inside the mine to the surface screening plant; where coal is gathered at long distances from the screening plant with other openings in the active part of the mine; or for comparatively small trackless mines with relatively short life. In mining service a belt is not usually operated under continuous full load and consequently is not used at peak efficiency; for instance one manufacturer recommended a belt with a capacity of 450 tons per hour where the total three shift production was only 600 tons. In other words, to haul an average of about 30 tons per hour it was advisable to have a capacity about 15 times above the average to handle the peaks. When analyzed, the above statement seems out of all reason but in practice there are many conveyors in operation with very high ratio between capacity and actual performance; this situation is not the fault of the belt but is due to the method of loading.

An increase in the use of steel and treated timber will be accompanied by continued experiments in sealing and air conditioning to prevent roof spalling. Timber supply a matter for consideration.

By J. A. Saxe
Chief Engineer,
Island Creek Coal Company

CURRENT estimates on materials required for post-war building lend no encouragement to the view that the present barely adequate supply of mine timber and attendant high prices will be greatly improved in the near future. Mill owners doubt that many of their former employees will be satisfied to return to their earlier vocation and environment. Their opinion could be summarized by one statement: "We will get you the timber, but not at the old prices." And that is what I believe we may expect.

Since timbering is the principal method of mine support, timber supply will become under these conditions a matter for more serious consideration by mine management, and it is obvious with a probable lower peak production of timber that stocking of timber and larger inventories must be anticipated as a future practice.

Successful Timber Recovery

Timber recovery has been long successfully practiced by a few companies with excellent results financially, and with an almost unbelievable safety record. Three million pieces of rail, ties, posts and headers were recovered without a fatality and only two lost-time accidents. The cost of recovery averaged sixty percent of the original value, the percentage of material recoverable varied with working conditions.

Use of Treated Timber and Steel Will Increase

The use of treated timber, where it can demonstrate the value of wood preservation, is obviously a sound practice. Generally, a wider use of treated mine ties in permanent haulages is certainly a proper policy for the mining industry to adopt and the use of treated headers and posts for permanent timbering should have more consideration than it has had in the past.

With increased timber costs and a much lower increase in steel costs, a larger percentage of steel timber can be used for roof support. At present, light sections are scarce but it is believed that these sections will be available later this year. Experiments on the use of 4 in. x 4 in. and 5 in. x 5 in. light section H beams on 11 ft. spans show these sections may be given wider use than is now practiced.

The increase in the amount of coal produced by mechanized mining has produced a trend toward wider mining faces. We can expect some proportionate increase in the amount of timber required to produce a ton of coal unless mining methods are carefully adapted to oppose this trend.

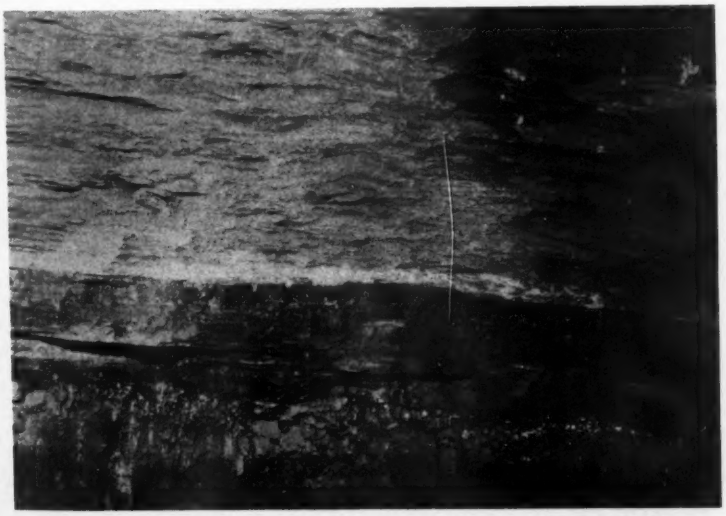
Roof Sealing and Treatment Problems

Roof sealing and treatment has been tried by several companies to eliminate or reduce the necessity for roof supports. Experience and good common sense indicate roof treatment should only be considered a means to preserve a firm roof that disintegrates or slabs in thin plates. Observations on treated roof indicate that the major cause of roof failure is moisture in the incoming air. Treatment of the roof should, in most cases, be done promptly

after a new face is exposed, and the treatment should be repeated until cracks formed by the initial roof settlement are sealed. Under present labor conditions, and with our present knowledge of roof treatment, only experimental projects along this line may be expected.

Air conditioning to remove moisture from mine air has been tried at several mines but engineers who have studied the data furnished by the operators owning these plants do not agree on the value of the results obtained. The methods employed at these mines do not provide a constant minimum moisture content necessary to prevent roof spalling. Since, it is only under certain atmosphere and cooling conditions, that this equipment will produce the desired reduction in the moisture content of the incoming air, it follows that the method is effective to the degree that favorable conditions occur for the functioning of the equipment. Air conditioning should not be attempted without a thorough knowledge of the air conditioning required, and it also should only be considered as a means of preserving a strong roof adversely affected by moisture or the lesser effects of temperature.

The strata overlying the coal seam in this open cut illustrates the nature of underground roof support problems



Clay veins and roof deterioration create difficult timbering problems

Coal Preparation

(Continued from Page 51)

1 inch or ¾ inch, will be more closely controlled than heretofore, as it is definitely established that size consist has a great effect on the performance of stokers, pulverizers, etc. Dustless treatment will be extended to a greater number of domestic users. The development of other products besides oil for dustproofing will be a subject of much research. Trade-marking of domestic sizes will be more widely developed and practiced than at present.

For metallurgical purposes in addition to coal cleaning greater emphasis will be placed on the blending of raw coals for increasing the uniformity of the final prepared coal. Blending of mine cars from various mine sections, the use of special bins and feeding arrangements for coals within certain analytical limits, so that the proportion of coal of each analysis can be controlled in the final clean coal, and layer loading in railroad cars or barges are some of the ways by which greater uniformity will be attained.

Coal By-Products

As a source of raw material for chemical industries the actual requirements for this purpose cannot be estimated. Considerable greater quantities of gas, tar, and oils will result from greater tonnages of coal converted into smokeless fuels. The latter is without doubt going to be a subject of much research and experimentation as a clean burning fuel will be in greater demand. For certain coals located favorably and with the necessary properties and characteristics, there will no doubt be larger tonnages required as a raw material for chemicals.

It is not expected that for general steam use coal preparation will go to such extremes in the production of finely tailored products in respect to analysis that excessive loss of coal in the refuse will result. More emphasis will be placed on uniformity in all factors affecting the coal's performance in use. Greater attention will be given to the economics of coal cleaning as preparation costs begin to represent a more substantial portion of the production cost. The most successful operations will be those that produce tangible benefits to both consumers and operators by economical cleaning methods.

Job instruction training as applied to safety in anthracite mining, will be continued in the future education of supervisory personnel.

By C. A. Gibbons
Vice Pres., Susquehanna Collieries Co.

EARLY in 1944 the management of the Susquehanna Collieries Company became interested in the Job Relations program of the Training Within Industry Service of the War Manpower Commission, whereby foremen are instructed in the essential art of getting along with the men under their supervision; that inasmuch as every human is different, people must be treated as individuals. After initial training at an Institute conducted by a representative of the War Manpower Commission, our Supervisor of Safety and Compensation and his assistant conducted conferences at all of our Collieries. Every supervisory official of the Company attended the full five two-hour sessions and, on completing the conferences, was given a certificate signed by the Director of the Training Within Industry Service. We are convinced that our foremen not only profited by their conference attendance, but that they enjoyed the sessions as well. Many expressions of appreciation were conveyed to the management and the results were, and continue to be, quite satisfactory.

How to Instruct

By reason of our experiences with Job Relations, it was not too difficult to get us to have a look at, or a preview of, the program of Job Instruction also sponsored by the Training Within Industry Service of the War Manpower Commission. We arranged a meeting of our top executives and a representative of the Training Service had little trouble in convincing us that, even if every supervisor is instructed in exactly the same manner, "telling" alone is poor instruction. He said in part, "Much of our instruction is telling. Thousands of workers are being *told* at this very moment. How many of them really understand." "Showing" is another most common means of instruction, but it was demonstrated that most of us just copy motions, and that showing alone is not good instruction. Again the Conference Leader said "Countless thousands of employees are being *shown* how to do their Jobs at this very moment, and how many of them understand?" It was emphasized that "If the Worker hasn't learned, the Instructor hasn't taught." We were also reminded that most workers are trained by being put with an experienced man, with probably as many different forms of instruction resulting as there were men being trained. After being convinced as to the many and various methods of instruction, it was demonstrated that we have available a sure-fire method of Job Instruction, illustrated by a four-point method, "How to Instruct".

Step 1. *Prepare the worker*
- Put him at ease.
- State the job and find out what he already knows about it.
- Get him interested in learning job.
- Place in correct position.

Step 2. *Present the Operation*
- Tell, show, and illustrate one Important Step at a time.
- Stress each key point.
- Instruct clearly, completely and patiently, but no more than he can master.

Step 3. *Try Out Performance*

Have him do the job—Correct errors.

Have him explain each Key Point to you as he does the job again.

Make sure he understands.

Continue until You know He knows.

Step 4. *Follow Up*

Put him on his own. Designate to whom he goes for help.

Check frequently. Encourage questions. Taper off extra coaching and close follow up.

The method of Job Instruction was accepted and, after participation in a training institute conducted by a representative of the Training Within Industry Service, our Safety Department personnel acted as conference leaders in the classes conducted in this subject.

Steps and Key Points in Lamp Assembly

It is almost immediately recognized that probably the most important part of the Job Instruction Program is the Job Break-down method of instruction or training in a job, or practice. Under this method the "Job" or operation is divided into chronological Steps and Key Points. A Step being a logical segment of the operation when something happens to advance the work, while a Key Point is anything in a Step that might break or make the job; injure the workman: make the job easier to do, etc., etc.

The practical application of this method in the conference room is the provision of a blackboard, small table or desk, and an informal atmosphere; the members of the conference being invited to take off their coats if they like, smoke if it is permitted, and generally, so far as is possible, make themselves at home. The conference leader makes every effort to be just one of the gang and to avoid any classroom manner, such as teacher or lecturer. One of our first sessions of this method was the Assembly of a Flame Safety Lamp. The lamp, unassembled, was placed in a small table near the blackboard. The blackboard was sectionalized into two parts, headed on the left by "Important Steps in the Operations", and on the right "Key Points". The conference leader said, "The first thing I do is to examine the Fount. (The first Step) I make sure it is filled with cotton and naphtha; that leather washer is in place; that plug is tight, turning backward to click is a good way to prevent crossed threads; make sure fount is clean, and then I find I can continue assembly best if I set fount on table. All of these are Key Points. The conference leader then goes to blackboard and records as follows:

PART—Safety Lamp	OPERATION—Assembly
IMPORTANT STEPS	KEY POINTS
1. Examine Fount	Filled with cotton and naphtha. Leather washer. Plug tight. Click. Clean. Set on table.

and as he writes he discusses the reason and importance of the step and each Key Point. He then advances to Step 2 as he remarks, "I then place admission ring", and the Key Points, "I examine gauze, look for breaks or dirt, examine face, examine washer, making sure it is free of obstructions and moves freely." In the same manner this is recorded on the blackboard and the assembly continues until the Breakdown on the blackboard is completed as follows:

PART—Safety Lamp	OPERATION—Assembly
IMPORTANT STEPS	KEY POINTS
1. Examine Fount	Filled with cotton and naphtha. Leather washer. Plug tight. Click. Clean. Set on table.
2. Place Admission Ring	Examine gauze. Examine face. Examine washer. Free of obstruction. Moves freely.
3. Place Glass	Look for cracks. Look for chips. Clean.
4. Place Washer Retainer	Washer. Not bent. Moves freely.
5. Place Gauzes	Look for Breaks, Holes, Dirt. Weakness. Try with finger. No Rust. Not bent.
6. Examine Expansion Ring	Tension. No breaks.
7. Examine Bonnet	Look for broken rods. Clean. Examine lock.
8. Place Bonnet	Turn to click. Glass movable to finger pressure. Locked.
9. Try Sparker	Strong Spark.

A member of the conference is then invited to make the assembly, explaining each Step and the Key Points as he continues, with the conference leader prompting and assisting as necessary, and then the conference leader asks that "Just so we are all sure that you are sure, will you make the assembly once more?"

In a word, it has been our experience that after such conference, every member was able to assemble the lamp in accordance with the Job Breakdown method.

Following several sessions, as outlined above, a meeting was held with Colliery Superintendents, Safety Department and other De-

Please turn to Page 61

Geologic studies of mining areas may reveal possibilities for keeping methane from mine air by removing it from the coal seam or adjacent strata through drill holes.

By A. J. W. Headlee
West Virginia Geological Survey

THE volume of methane released from the mines of West Virginia is equal to, or even greater than, the state's production of natural gas. Some of the more gassy mines are known to produce as much as 10 million cubic feet of methane each day and many of them 6 or more million so that it is readily seen that many billions of cubic feet of methane escape into the mine air each year. The technology developed by the petroleum and gas industry could be adapted to the economic recovery of this methane and the first step in such a development should be investigations of how the gas is held and released by the coal seams.

Where the Gas Comes From

Gas encountered in coal mining often comes from rock strata above or below the seam and not from the coal itself. For example, an operation that was mining Pocahontas No. 3 and No. 4 coals, in 1938 encountered methane in such quantities that mining operations were stopped in this area while several boreholes were drilled from the surface ahead of the workings in an attempt to drain the gas off. Gas was first encountered in the sandstone about 80 feet below the surface, the release of which materially lessened the flow of gas into the mine. A total of ½ million cubic feet of gas per day was obtained from four boreholes along a 1,000-foot line. Even though these boreholes markedly decreased the gas escaping into the mine, large quantities of gas continued to enter through the floor, indicating the presence of another gas reservoir below the seam. Here a large quantity of water was also entering the mine along with the gas. When these wells were again visited in 1941 they were still producing some gas, and a large quantity of gas was still coming through the floor of the mine. Another well had been drilled about a mile above the first group of wells and it was producing several hundred thousand cubic feet of gas per day. These cases are given as examples of gas escaping into the coal mine from reservoirs above and below the seam and illustrate how the usual methods of gas production can recover commercial quantities of gas and lower the ventilating costs.

One does not need to expand on the statement that methane also escapes into the mine from the coal seam. The gas has considerable pressure in the virgin coal and migrates in the direction of release of this pressure, namely, the mine workings. The gas will flow rapidly into boreholes in the high pressure area, and the quantity of gas escaping into the mine will decrease if this high pressure gas is bled off through boreholes.

Theories of Origin

Methane is one of the products resulting from the conversion of organic matter into coals. The methane is formed by biochemical reactions and (or) by natural slow "carbonization" of the coal-forming substance.

Biochemical reactions now operative on materials other than coal are producing some of the methane in the mine atmosphere. Water samples collected from a mine in the Pocahontas seam have been producing methane in quantity for more than 6 years. Two of four samples collected in August, 1941, have produced their own volume of methane in less than 6 months; the third sample produced one-half its volume; while the fourth has not given off any methane. These tests indicate that considerable quantities of methane are being produced in these mine waters now. Some or all of the gas found in the sand above and in the coal of this mine

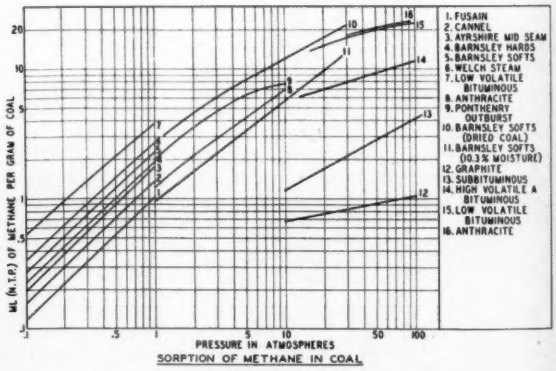


Figure 1

Published by permission of R. C. Tucker, Acting State Geologist.
Extracted from paper by Paul H. Price and A. J. W. Headlee as published in The Bulletin of the American Association of Petroleum Geologists, April 1943.

may have been made by methane bacteria in percolating ground waters. Gas is always associated with large quantities of water in these mines and future studies may develop methods of destroying these methane-forming bacteria.

Commercial Recovery Based on Modes of Release of Gas from Coal

For the most part, methane is sorbed in the coal; the question as to whether it is adsorbed or absorbed has not been answered satisfactorily. The quantity sorbed on various coals may be represented by the Freundlich equation over certain pressure ranges. A chart of the pressure in atmospheres, plotted against the quantity sorbed in cubic centimeters per gram of coal is shown in Figure 1. The curves for the coals are parallel where the experiments were continued below one atmosphere pressure.

It is to be noted that at 10 atmospheres many coals sorb 10 volumes of methane per gram of coal so that there is as much gas present as could exist there, if the coal were absent. The heat of sorption has been determined for Pocahontas No. 4 coal as 6,900 calories per mol for the first methane sorbed on the surface and the heat of sorption reaches a constant value of 5,200 calories after 1.55 ml. per gram is adsorbed on the coal. Actual pore space in coal has not been observed so that it appears that most of the methane is held in the coal by some sorption process.

Recovery techniques must consider the fact that the methane is sorbed in the coal and that the ultimate release of gas from the coal will be a desorption process. Closer drilling will be necessary than is customary in natural gas fields. It may be possible to hasten the release of the gas by shooting to create a large fracture area about the well. A method of horizontal drilling has been suggested which may make it possible to remove this natural coal gas economically. It is proposed to drill horizontal holes in the coal seam 4,000 feet long, 800 feet apart, each hole to be cased and grouted for the first 400 feet. Each well would be connected to the surface by a vertical pipe and the entire system placed on a vacuum to hasten the flow of gas.

The rate of escape of the methane into the hole is of prime importance and this rate will determine the economic feasibility of any method of production. Unfortunately there are practically no data available on the rate of release of gas from virgin coal into boreholes. Several studies have been made most of which give data for the fracture and drainage belt only. Some European investigators have studied the release of gas from virgin coal and have attempted to bleed off the gas with boreholes into the coal, but without success. The great variation in gas emission from different sections of the same mine and adjacent mines offers qualitative support to the idea that a wide range of permeabilities exists in virgin coal. The permeability of coal to methane needs to be determined in the laboratory.

In some areas large quantities of gas are known to be present above and below the coal, which have ready access to the coal seam through a well developed fracture pattern. This gas can be recovered by drilling into the fracture system in the coal and in such cases horizontal drilling will intercept many fractures as compared with vertical boreholes.

Started by methane underground, a mine explosion travels to the surface

Supervision

(*Continued from Page 59*)

partment Heads, at which meeting it was suggested that this same method be employed in our various Safety Meetings on the theory that all Supervisors would then have the opportunity of assisting in the building of a pattern of proper instruction, and that thereafter we would all employ the same translation of a safety rule, practice or operation.

Inasmuch as roof-fall accidents are responsible for the greatest number of fatal and serious accidents in the Anthracite mines, it was decided that roof control should be first considered by the conference, and, in roof control, proper inspection is of prime importance.

After conference has assembled, the Job Breakdown method, as described above, is employed for this portion of the meeting.

Instruct for Roof Timbering Inspection

Face Inspection was selected as the first subject, with Top Test as the operation. The Superintendent, after proper introductory remarks, turned the meeting over to the conference leader, who, through discussion, developed that the first *Important Step* in face Inspection is to note the Distance of Timber from Face, and the *Key Point*, That it should be no more than Regulation Distance. As we continue with our Top Test, the next logical *Step* is to Protect Eyes, and the *Key Point*, With Goggles or Eye Shields. It naturally follows, the next *Step* is the Selection of Proper Tool, and the *Key Points*, Solid Bar, Hammer. Use head of tool; strike lightly at first.

As each Step and the Key Points were developed, and agreed upon, the conference leader recorded the summary on a large blackboard, with the completed Job Breakdown following the same plan as shown on page 59.

Future Program Will Promote Greater Safety

Several conferences may be required to complete each Job Breakdown exhibit. We believe this is a desirable factor as it permits time for consideration rather than snap judgment. After final acceptance it is suggested that mimeograph copies of the outline be supplied each member of the conference, and it may be desirable that same be printed for general distribution to the workmen. Of course, in different locations and under different conditions, the decisions of the conference may differ somewhat in detail from the example as shown, but this has no effect on the method.

In conclusion, judging from the fundamentals of Safety—Education, Supervision and Discipline—with special emphasis on Education, we believe the Job Instruction Method as applied to Safety in Anthracite mines has much merit. Our Supervisory Staff has expressed approval of this new idea, which we hope to continue through Timbering, Use of Explosives, Transportation, and other phases of Safety Education.

Open pit operations will encounter increasingly severe conditions in the future; larger equipment and improved technique will be developed to work thinner seams and heavier overburden.

By Harrison Eiteljorg
Gen. Mgr., Morgan Coal Company

THE post-war outlook for the strip mining industry is excellent, but there are trends that should not be overlooked. The cost differential between highly mechanized underground mining and strip mining has narrowed considerably; in fact some underground mines are showing lower costs than "average" strip costs.

To compete after the war, the large and the smaller strip mine operator must get increased efficiency from stripping equipment and haulage equipment, must give the coal real preparation, and the entire strip mining industry must employ good salesmanship. The Midwest and Western operators have used good salesmanship in the past and have backed this up with good preparation; consequently strip coal is accepted on a par with deep mined coal, in those markets.

Present War-Time Operations

This, however, does not hold true in other sections of the country. In certain parts of Pennsylvania, West Virginia, Ohio and Kentucky conditions recently have been reminiscent of the Gold Rush Days. Hundreds of small operations, using all types of equipment, sprang up over night. Everyone with idle equipment that would move dirt was out-bidding others for a little patch of easy stripping; and low-grade crop coal was dumped mine-run into railroad cars without picking, thereby giving all strip mined coal from these fields an unsavory reputation. As a further result of this intensive mining, many of the shallow and what could have been low cost stripping areas, even in the new fields, will be practically exhausted with the end of the war. Most of the participants will return to their former activities as soon as conditions permit, some of them perhaps after having made greater contributions financially to the production program than patriotism would demand. Nevertheless, the many operations of this class have accounted for a substantial part of the increased production of strip coal, which in 1944 enabled the industry to exceed the quota set by the Solid Fuels Administration.

Harder Conditions for Future

Each year strip mining gets tougher. The overburden gets heavier; the rock gets harder; or the coal is thinner; haulage gets longer; washing becomes more essential, to be followed by drying; and legislation in several states becomes more unreasonable. The investment is great in a modern, efficient strip mine, and the investment becomes greater as the conditions become tougher. Consequently the industry will drift into the control of strong, financial interests. Strip mining is already big business in the Middle-West and Western states, and more and more of the coal stripping that will be done in the Eastern and Southern fields will be undertaken by old, established coal companies heretofore identified with deep mining exclusively.

Many of the new operations in the Eastern field will be combination strip and drift operations. Already a tendency is developing toward this type of operation wherever applicable. There always will be room for a well-managed, well lo-

cated, small strip mine, particularly, if within reasonable trucking distance of a good market. Whether we like it or not, the sale of truck coal will increase after the war.

Larger Equipment and New Ideas

The equipment manufacturers have been actively engaged in designing and experimenting with equipment to handle deeper overburden more efficiently. The latest

Open pit mining under heavy cover in the Midwest

practical development has been the large dragline capable of handling a 25-30 yard bucket on a 185 foot boom. These new, big draglines have capacity and reach to handle 75 or 80 feet of overburden and will be used alone as well as in tandem benching ahead of the stripping shovel. Several stripper manufacturers are reported to have completed preliminary design and engineering on shovels and draglines of 50 cubic yard bucket capacity. There will also be substantial increases in the size and range of the smaller crawler mounted draglines and high-lift stripping shovels. Small dragline capacities up to 5 yards on a 100 foot boom and high-lift shovel capacities up to 4 yards are scheduled for shortly after V-Day. And, of course, there will be further improvements on the present 35 yard stripping shovels and intermediate sizes.

The same condition that exists in the bituminous fields seems to exist in the anthracite fields and the operators there are planning to use larger and larger equipment to handle depths of overburden that stagger the imagination.

There also has been a large amount of experimentation with other types of "digging machines," including the digging wheel and stackers and several of these ideas have definite possibilities for specific jobs. In addition to new machines, considerable advancement will be made in the methods of drilling and shooting the overburden so that it can be handled easier and faster and out of this war will come many other technological advances in lighter alloys, electronic devices, new explosives, improved trucks and tires, improved welding techniques. Even "Walkie-Talkies" may be used to facilitate supervision.

New Fields

The greatest activity at the present time and for the immediate future in the development of new properties is in the Eastern and Southern fields and in West Kentucky, where there are several new developments planned, particularly in the No. 11 Seam. The potential tonnage of strip coal in Indiana has about reached its peak. There are some new developments scheduled in Illinois, but the chances are there will be just about enough to offset the tonnage loss from the other strip mines that will work out. It is not expected that there will be enough developments in Missouri, Kansas or Iowa even to maintain present production; however, the Arkansas-Oklahoma field should probably show an increase in tonnage due to the market demands for smokeless coal. There is considerable talk about opportunities in the far West.

Strip mining along the coal outcrop in the mountains of the Appalachian Field

Machine Mining

(Continued from Page 43)

we can take out a unit assembly and substitute one that is new or rebuilt, in far shorter time. Then we can take the other to a clean, well lighted bench and rebuild it without mixing the grease with sand and coal dust.

Before the war the use of alloy steels for working parts and corrosion resisting plates, and even the use of light alloys, had already become commonplace in mining practice. Substitutes for rubber and copper and light alloys have in some cases forced the development of new answers which were an improvement over original design. At any rate the post war machinery will have available not only the use of such materials as are required but also the benefit of tremendous technical improvements in hydraulics and electronics that are now employed in the airplane industry. Hydraulic control and hydraulic motors have a wide application to mining machinery.

Haulage With Truck and Conveyors

More specifically, we believe that underground main line haulage is going to be improved in road bed, cars and locomotives, to support safe speeds of twenty miles per hour. For main line service and even for face operation in high seam mines we see the wider use of cars with double trucks having capacities above ten tons of pay load per car. The higher speed will require better road bed drainage and a better ballast than mine refuse. Further improvement is necessary in couplings to handle these heavier loads faster.

Conveyors will come in for many new refinements, particularly belt conveyors used for gathering in low seam mines. These belts are going to run faster when they serve shuttle car sections where the flow to the belt now has to be choked to prevent overloading and spillage. More thought will be given to design for ease of handling of belt conveyor intermediate sections and to making provision for training of belt in either direction. Particularly in very low coal it should not be necessary to brush a roadway to get timber back to the room neck because the belt will train in only one direction. Many belts now are handling supplies on regular schedule. Many experiments are now proceeding in low coal mines to find a better answer than high brushing at belt transfer points. This deserves a lot of study.

Rubber Tires for All Machines

Shuttle cars have proved to be of great value under favorable conditions of grade and floor. Even in soft bottom when adequate power is available they have shown much promise. The strip pits have already proved what soon must be realized by underground mines that haulage on rubber can be cheap only if it is done on real road and some of the high maintenance of shuttle cars can quite profitably be transferred from the cars to the pavement.

Practically all types of modern mounted cutters have been successfully put on rubber wheels. We shall also see the rubber mounted carrying truck for short wall machines, drills and other utility service for use in trackless sections. We also shall see the rubber wheel mounted loading machine. It is much more difficult to provide proper rubber tire support for an arcwall type of cutter than for a loader, and under certain bottom conditions the rubber wheel mounting for a loader will develop some advantages over other methods of mounting. Other refinements in track mounted and caterpillar mounted loaders will include further use of unit assemblies for aid in maintenance and improved flexibility of control.

One Machine for Complete Mining

For many years the goal of forward looking engineers has been the development of machines to do a complete mining job. The drilling and blasting of the material between the cutting and the loading operations has been and still is a difficult hurdle to cross. At least five types of digging and loading machines have been tried with varying degrees of promise and there still appears to be a long period of development and experiment in this direction. It is possible in many cases to combine two, at least, of the four major jobs of cutting, drilling, loading and conveying. As illustration we have the self loading conveyors like the duck bill which loads and conveys the coal, the use of mounted drills on the mining machine to cut and drill with the same crew and the short wall loader that cuts and loads in a simultaneous operation. The effect of such combination is an increase of man tonnage which is one of the yardsticks of efficiency.

The most interesting period in the history of coal mining should be the one that follows the war end, because the flood of new ideas and machines that will be released will find a more sympathetic reception by mine operators than ever before.

This loading machine operator works in safety and comfort

AMERICAN MINING CONGRESS WASHINGTON 4, D. C.

Percentage Depletion Upheld

Mining Congress Secretary strongly urges Senate Committee on Banking and Currency to require recognition of percentage depletion as a cost item in determining mineral prices

JULIAN D. CONOVER
Secretary
American Mining Congress

THE American Mining Congress, representing the various branches of the mining industry of the United States, has been much concerned over the refusal of the Office of Price Administration to recognize percentage depletion as a cost item in determining allowable price ceilings for mineral products.

We object strongly to the recent action of that agency in excluding percentage depletion, beginning January, 1945, from the monthly cost tabulation required from bituminous coal producers. This action represents a distinct departure from the OPA's practice prior to January 1, which had followed the precedent established by the Bituminous Coal Division in determining prices under the Bituminous Coal Act. We are informed that OPA has likewise denied percentage depletion as a cost item for iron ore and for other metals and minerals to which it was made applicable by the Congress.

We submit that OPA's action in this respect is contrary to the intent of the Congress when it amended the Emergency Price Control Act in 1943, to require "that no such regulation or order shall contain any provision requiring determination of costs otherwise than in accordance with established accounting methods." We disagree with the OPA's interpretation, that this provision of the statute left it free to prescribe the use, in all cases, of one particular accounting method, such as "sustained" depletion, and to deny the use of percentage depletion, even though the percentage method is used by the producer. We believe the actual intent was clearly stated in the hearings by members of this Committee, who insisted that if a mineral producer uses percentage depletion, that is *his established accounting method*, and that the OPA must recognize it as such in its cost computations. Not to do so would be contrary to the long established custom and practice of the mining industry, recognized by Congress both in the Internal Revenue Code and in the Bituminous Coal Act (which was itself a price control law).

The Congress has prescribed (Sec. 114(b)(4), I. R. C.) that the allowance for depletion in the case of coal, metal and certain other mines *shall be computed on the percentage basis*, except that in no case shall it be less than it would be if computed on the "sustained" basis. As to mines for which—in compliance with the law—depletion is computed and allowed on the percentage basis, *percentage depletion is clearly the established accounting method*, and it was not intended that OPA should have the right to prescribe some other basis.

Depletion, in the case of mineral resources, is not a theory but is a *central fact* which must be considered in all Government policies and procedures relating to mines. Coal and other minerals, once extracted from the ground and consumed, are gone forever. The capital value of the mine is exhausted as the mineral is taken out. The exhaustion of this capital value is a definite factor in the costs which must be considered in determining prices. Recognizing these basic facts, Congress over the years has given careful study to the best means of providing proper depletion deductions and has adopted percentage depletion as an essentially fair method, possessing the advantages of certainty, simplicity, avoidance of discrimination, and avoidance of long drawn-out disputes over the uncertainties involved in engineering estimates of ore reserves, rate of extraction, anticipated costs and profits, etc. Percentage depletion affords a simple, equitable means of measuring the exhaustion of the capital value of the deposit.

OPA advances the argument that percentage depletion is "unrealistic and unsound for cost determination" because it provides a deduction only against years in which there is net income. Manifestly, however, it is only out of operating profits and not out of losses that capital value must be recovered. This fact was recognized by Congress in establishing percentage depletion, and the OPA's argument in reality is a further demonstration of the soundness of the percentage method and the importance of recognizing it in cost computations.

The inclusion of a proper and adequate depletion allowance in determining price ceilings on mineral raw materials is highly important to the mining industries, which have produced at expanded rates to meet war requirements and have been unable to maintain customary development work in blocking out reserves for the future. Depletion allowances are frequently the only source from which costs of such needed exploration and development work can be met. Further, if a part of the proper depletion charge is disallowed, coal and other branches of the mining industry may, under OPA's formulas, be required unjustly to absorb increases in cost when they are in no position to do so.

To correct the OPA's action in this matter and to insure that the intent of Congress is carried out, we urge affirmative action by your committee to require the recognition of percentage depletion as an item of cost. We endorse the amendment suggested by the National Coal Association for this purpose. The discussions at the hearings leave no doubt as to what Congress intended in requiring OPA to observe "established accounting methods"; but in view of the OPA's arbitrary and erroneous interpretation of this requirement, Congress should now make it clear (as it did in the Bituminous Coal Act) that determined costs shall include depletion as determined by the Bureau of Internal Revenue in the computation of the Federal income tax.

CAPTAINS OF INDUSTRY Plant your flag on top, too!

This year we've got to make 2=3!

This year we've got to make 2=3! We've got to lend Uncle Sam in 2 chunks almost as much as we lent last year in 3. Which means that, in the approaching 7th War Loan, each of us is expected to buy a BIGGER share of extra bonds.

The 27 million smart Americans on the Payroll Savings Plan are getting a headstart! Starting right now they are boosting their allotments for April, May and June—so that they can buy *more* bonds, and spread their buying over *more* pay checks.

Our Marines went over-the-top at Iwo Jima in the greatest, and hardest, battle in the Corps' history. Now it's *your* turn! Your quota in the 7th is needed to help finish this war, sidetrack inflation, build prosperity. So, captains of industry, plant your flag on top—like the Marines at Iwo Jima!

★

CAPTAINS of INDUSTRY—here's your *Check List* for a successful plant drive:

- ★ Get your copy of the "7th War Loan Company Quotas" from your local War Finance Chairman. Study it!
- ★ Determine *your* quota in E Bonds — the backbone of every War Loan.
- ★ Arrange for plant-wide showings of "Mr. & Mrs. America"—the new Treasury film.
- ★ Distribute "How to Get There"—a new War Finance Division booklet explaining the benefits of War Bonds.
- ★ Circulate envelopes for keeping bonds safe.
- ★ Display 7th War Loan posters at strategic points.
- ★ And—see that a bench-to-bench, office-to-office 7th War Loan canvass is made.

★

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

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Mining OPTICAL MINERALS

The Demand for Optical Minerals Has Increased With the War, Necessitating Not Only Expansion of Foreign Production But Also the Development of Domestic Supplies

By G. RICHARDS GWINN
Associate Mineral Economist
Nonmetal Economics Division
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NATURAL crystals of quartz, calcite, and fluorite have important uses based on their optical and electrical characteristics. Although the requirements are relatively small the requisite qualities are very exacting, and as the crystals are easily damaged they must be mined and prepared with the utmost care.

The requirements of domestic industry for these optical minerals were not great before the present World War and were supplied largely by imports. Quartz was obtained from Brazil and calcite from Iceland and South Africa. The optical grades of these minerals were mined chiefly by individuals using primitive equipment and working only part time, or as specialty work by a few operators working in cooperation with optical-instrument manufacturers. The quantity required in the manufacture of lenses and prisms in photographic, optical, and other precision instruments has been increased by the war. The greatest demand is for radio-grade quartz for use in radio transmitting and receiving sets, long-distance telephone lines, and detection equipment. It became necessary therefore not only to expand production in Brazil and other foreign sources but to locate a domestic source to supplement the imported supply. Minor amounts have been produced in Madagascar, Australia, and the United States, but Brazil remains the world's major producer of radio-grade quartz.

Initial Mining Considerations

Information on the mining of optical calcite and fluorite is meager because the quantities required annually (300 to 500 pounds) have been small and specifications so rigid that mining for these materials alone is usually unprofitable. So far as known no mining operations have been set up primarily to mine optical fluorite. A paper on the prospecting and mining of optical calcite by E. W. Newman of the Bureau of Mines and L. J. Cody of the Metals Reserve Co., is, however, in preparation, and it will give much-needed information on this subject.

Although these minerals vary in chemical composition and physical properties there are similarities in occurrence and mining. Commercial deposits of optical quartz, calcite, and fluorite are found in veins and veinlike bodies. The most acceptable material is found in vugs and clay pockets, which occur at random in these deposits.

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Minimum weight of quartz crystals or pebbles is 100 grams and crystals must have a minimum diameter of 1 in.

No one has been able to suggest how to determine, from the surface appearance of a vein or dike, the number of vugs and the quantity of crystals to be found at depth. Generally it is necessary to mine or quarry the entire deposit in search of vugs containing crystals. This necessitates the mining of large quantities of rock to obtain a small amount of usable crystals and makes such operations difficult and costly.

Mining cannot be completely mechanized because fractures induced by rough handling or blasting will ruin the crystals; they must therefore be removed by hand.

Important Physical Properties Which Qualify the Product

Quartz.—Although quartz, next to the feldspars, is the most common mineral in the earth's crust, only a very small quantity is satisfactory for optical and radio use. Quartz occurs in rough masses, composed of single crystalline individuals without distinct faces, as faced crystals, and as massive aggregates of minute separate grains.

Faced crystals are commonly hexagonal prisms elongated in the direction of the vertical axis and terminated by a six-sided pseudopyramid. The six prism faces are almost invariably striated, and the striae are at right

angles to the vertical axis. The actual shape and relative development of the faces on crystals vary widely, but the angle between the faces remains constant. The oxygen and silicon atoms which constitute the structure of quartz are arranged in either of two alternate patterns. These alternatives are related in the manner of mirror images—that is, the crystals may be right- or left-handed.

Piezoelectric Quartz

The use of quartz in radio is based on its piezoelectric properties. Crystals of 13 minerals, the most common being rochelle salts, quartz, and tourmaline, have piezoelectric properties. Of this group, quartz, though not possessing the highest piezoelectric constant, has the best mechanical properties.

The term "piezoelectric" is derived from the Greek "piezein" meaning "to press." A substance is said to be piezoelectric if, when its shape is changed by the application of mechanical pressure, electrical potential differences are created between parts of its surface. The reverse effect is also true. If a potential difference is created on opposite sides of the slab or crystal plate, a small change in shape results.

When a small, thin plate of quartz is held between metal plates to which a pulsating current is applied, the quartz will tend to vibrate with the frequency of the applied pulsating current. However, the quartz has a natural period of mechanical vibration which is determined by its shape, areal dimensions, and thickness. If the dimensions of the plate are such that its natural period of mechanical vibration is the same as that of the applied current, the plate will vibrate in sympathy with the current pulsations. However, if the frequency of the current tends to change, the plate, whose rate of vibration is fixed, imposes a potential on the electrical system and maintains the applied potential variations at their original frequency. The effect of this control is to maintain a constant rate of oscillation in the transmitting circuit and thus a fixed frequency of the signals emitted.

Calcite for Nicol Prisms

Optically clear calcite, or Iceland spar as it is sometimes called, because it was first discovered in Iceland, is characterized by a high degree of purity, transparency, and perfection of crystalline structure. Calcite crystallizes in a great variety of forms, most of them being rhombohedrons and scalenohedrons. It has perfect cleavage in three directions parallel to the rhombohedral faces which intersect at angles of about 75°. It has a hardness of 3, according to Mohs' scale.

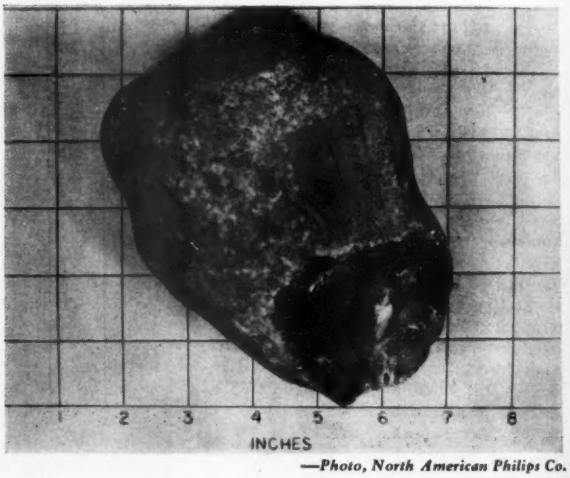
The most important use of optical-grade calcite is in the manufacture of nicol prisms, an essential part of polarizing microscopes, saccharimeters, photometers, dichroscopes, colorimeters, and polariscopes.

Fluorite Corrects Spherical and Chromatic Errors

Fluorite is a moderately hard (No. 4 on Mohs' scale) glassy mineral, transparent or translucent, and may be purple, green, rarely yellow, brown, blue, pink, or colorless. It crystallizes in the isometric system, usually in cubes. The crystals have good octahedral cleavage and perfect octahedra may be easily cleaved. It has a low index of refraction (bends light very slightly), disperses light faintly (its refraction of red rays differs only a little from its refraction of yellow rays), and normally displays no double refraction.

This unique combination of optical properties accounts for its use in lenses and lens systems to correct spherical and chromatic errors. It is also used in spectograph prisms and other optical apparatus where transparency of the ultra-violet and infrared parts of the spectrum is essential.

River quartz although showing the results of erosion is often of excellent quality because surface imperfections have been eroded away



—Photo, North American Philips Co.

Manufacturing Specifications

Quartz—Quartz suitable for use in the manufacture of oscillator plates for radio use must meet the following specifications:

It must be transparent and contain a minimum of twinning, veils, cracks, and inclusions. Optically clear material is preferred, but quartz containing moderate quantities of hard and soft blue needles, some color, fine bubbles, and inclusions is acceptable. An opaque incrustation on the surface does not make the quartz defective, but it may be chipped away by the supplier if necessary to permit examination along the optic axis.

Minimum weight of crystals or pebbles is 100 grams; no maximum has been set. Crystals must have a minimum diameter of 1 in. The 100- to 200-gram weight group is classed as radio grade only when a continuous volume comprising 80 percent of the crystal is clean by inspection without instruments. In the 200-gram and above weight group a minimum comprising 30 percent of continuous volume of each crystal must be usable.

Optical quartz shall, in general, consist of crystals 500 grams and above in weight, with a minimum of 45 percent of the crystal usable. It shall suprass oscillator quartz in quality, be free from stain, and give good definition when used with monochromatic light. It need not be free from electrical twinning.

Calcite.—Crystals or nodules must be colorless, absolutely transparent, and completely free from flaws, fractures, twinning, or cloudy inclusions. It must not show any internal iridescence or rainbow colors. The sizes of cleavage rhombohedrons required are established on the basis of finished prisms. The minimum and preferred sizes of the prism faces range from 10 x 25 x 25 to 40 x 40 x 40 millimeters. The buyers prefer to cleave the calcite to size and therefore request that the crystals or masses be left in as large pieces as possible.

Fluorite.—Fluorite suitable for optical use must contain a portion at least one-fourth inch in diameter free from flaws and must be colorless or nearly so. Colorless material is essential for some highly specialized uses, but faint tints of green, yellow, and purple do not in themselves render material unsuited for some optical purposes.

Sources and Occurrence

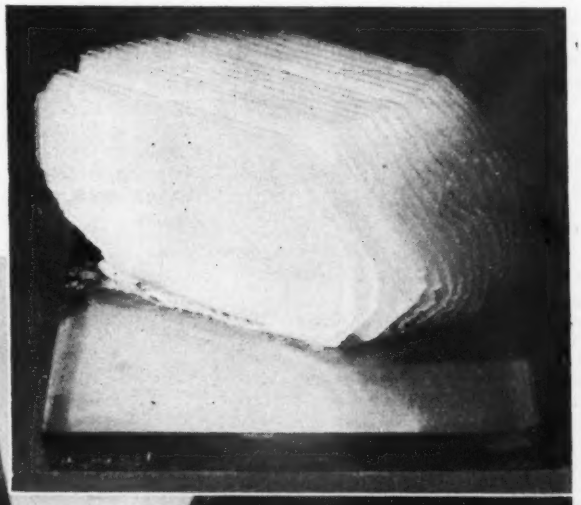
Quartz.—Optical and radio-grade quartz is found in veins of massive quartz which have been intruded into

sandstone, shale, quartzite and gneiss, as inclusions in granite, in quartz cores of pegmatites, in residual deposits from weathered pegmatites and quartz veins, and in cemented gravels from ancient river channels. Brazil is the principal source of supply, and information on the mining of this material is confined largely to reports from Brazilian operations.

Radio-grade quartz in Madagascar occurs chiefly in caverns in quartzite in the mountains southwest of Antananarivo. In Australia the most productive deposits are pipes of massive quartz in granite near the contact with porphyries and slates in New South Wales and Queensland. Bismuth, molybdenum, wolframite, and crystals of quartz occur in these pipes. Radio-grade quartz has been recovered from small quartz veins in schist and gneiss in Colombia and Guatemala. A few crystals have been recovered in the United States from cemented river gravels in California and from pegmatites in North Carolina, Virginia, Alabama, Georgia, Arizona, Colorado, Washington, Idaho, and Nevada. However, the largest deposits occur in the sandstone, slate, and shale of the Ouachita Mountains in western Arkansas. Deposits have been reported in the Central Urals and the Bashkir Republic of the U. S. S. R., and Uganda in Africa.

Calcite.—Optical calcite is found in vein deposits of massive calcite which occur in basalt, diabase, andesite, schist, and sandstone. Usable crystals or cleavage rhombs are confined to vugs in veins and in caverns in the adjacent country rock. The most productive veins have been found below the frost line, as the movement of the crust due to freezing and thawing is sufficient to fracture surface material. The veins pinch and swell, and vugs are usually found in the wide portions, as well as along joints, fractures, and at abrupt changes in the strike of the vein. Commercial deposits of optical calcite have been found in Iceland, South Africa, the United States, Spain, U. S. S. R., and Mexico. Calcite has also been found in Canada, Argentina, Colombia, and Brazil, but no commercial production has been reported.

The Iceland deposit near Eskifjordur on the east coast of the island was discovered in the early part of the 17th century, but development was



Wafered quartz crystal with wafers still in place. Top surface was perpendicular to saw during cutting

—*Photos, North American Philips Co.*

Chain vise holds irregular quartz in place for cutting approximately perpendicular to Z. Accuracy of sawing is high and is checked through X-ray control

not begun until 1850. The calcite is found in joints, vugs, and clay pockets in altered beds of basalt. This mine supplied the world market until 1920. Operations were discontinued during the last war, and the deposit was flooded to keep the crystals from weathering. It was reopened later, but the quality of most of the calcite recovered was below optical standards. From 1920 until the present war, veins in weathered schist and gneiss in the Kenhardt district of the Cape Province, South Africa, have been the main source of the world supply.

Iceland spar deposits were first discovered in the United States in 1907 near Graycliff, Mont., where about 600 lb. of optical-grade calcite were recovered. Several other deposits were discovered in this state, although very little acceptable material was obtained. The Montana veins were reopened in 1943, and additional and larger deposits have been developed. The calcite occurs in steeply dipping veins in an andesite sand.

In 1920 deposits were found near Cedarville, Calif., but no commercial production has been reported. The operation of a deposit near Truckhaven, Imperial County, was begun in 1942. Here calcite occurs in weathered sandstone in a series of steeply dipping veins and has the form of plates developed uniformly parallel to the base, with subordinate scalenohedral and rhombohedral faces.

In 1931 calcite was found in the Copper Hill mining district in Taos County, N. Mex. This tabular or conical deposit occurs along a fault plane in schist. Mining was begun in 1939, and several thousand pounds of optical-grade material were recovered. However during a period of charges and countercharges concerning operating rights and ownership, the deposit was largely destroyed by blasting. Several other small deposits have been reported in New Mexico.

The calcite deposits in the state of Chihuahua, Mexico, consist of veins in latite and andesite volcanic flows. Optical-grade material is found in vugs and caverns in the veins and the adjacent country rocks. Crystals of optical-grade calcite have been received in the United States from Spain, but information on their occurrence is lacking. Deposits have also been reported in the Republic of Cherkess of the U. S. S. R.

Fluorite.—Fluorite occurs under widely varying conditions. Its most common occurrence is as vein material associated with sulfides or sulfates such as galena, sphalerite, and barite. Veins containing fluorite occur in association with igneous, metamorphic, and sedimentary rocks. The most extensive commercial deposits are those filling veins or partly replacing beds in limestones. Virtually all important deposits are in or near fault fissures, and some evidence of igneous activity is to be seen at or near most of the deposits.

A peculiarity of optical-grade fluorite is its conchoidal (irregularly curved) fracture and an absence of the pronounced cleavage that characterizes the ordinary material.

Details of Mining Methods

Quartz.—Quartz was mined in Brazil before 1941 largely by the Brazilian free-lance miner or "garimpeiro." He worked from March to December, often leaving his home for several months at a time accompanied by his family. Father and sons did the digging, while the wife and daughters built the hut in which the family lived, broke poor crystals and defects into lasca (small water-clear pieces used for fusing), and collected small pieces of crystal from the earth. Operations were abandoned during the rainy season from December to March. Most of the usable material was obtained from the northern part of the State of Minas Gerais, but increasing quantities are now being received also from the States of Baia, Goiaz, and Espirito Santo.

The miner prospected as follows: On arriving in a quartz-bearing region he searched for pieces of quartz occurring as float, or the outcrop of the vein or pegmatite. After locating a promising area he dug one or more holes in an attempt to locate the vein; if successful, he worked the part of the vein that promised the clearest crystal. The average depth of operations was 2 meters, although a few were as deep as 5 meters. Mining was done by hand, using picks, shovels, mattocks, hammers, and bars. If water was encountered, the pit was abandoned unless the miner could obtain a hand pump or small portable gasoline pump.

In some localities quartz veins 1 to 3 meters wide occur in sandstone, with an overburden of 5 to 10 meters. These veins were usually discovered by outcrops in gullies or along stream banks. Claims about 10 to 15 ft. wide were staked across the vein, and the overburden was removed by hand in a series of benches that approached each other as the pit deepened. When the vein was reached, the pit resembled an inverted pyramid with the apex at the vein. After the usable material had been removed the miners moved on and began the bench process again. Each shovelful of dirt was handled three to five times to get it to the top and over the side of the cut. If water was encountered it also was handed up the benches in tin cans. The benches varied in width and height, depending on the whim of the operator, and thus adjoining claims or pits would have benches or steps of different sizes.

Skilled Labor Scarce

There were few so-called mines because of the scarcity of skilled labor, the great distances between producing fields and the railroads, lack of roads to transport mining equipment, and the high cost of gasoline and repair parts. Reports on several pits give the following average figures relative to the material removed and radio-grade material recovered:

Three tons of waste removed for each ton of vein quartz mined.

Fifteen percent of vein quartz in crystal form.

Fifteen percent of crystal material clear enough to be removed.

Twenty percent of the removed material remains after chipping into eye-clean material.

Seventy percent of eye-clean material rejected at the inspection station.

Seven hundred and forty tons of vein quartz removed for every ton of quartz crystal exported, and 2,960 tons of waste excavated, or 3,700 tons of material moved for each ton of quartz crystal exported.

This type of mining involves high costs because of the excessive handling of the crystals and waste. Therefore engineers, geologists, and mining equipment were sent to the quartz crystal regions in Brazil by the Foreign Economic Administration to expedite production.

Three types of deposits are now being mined in Brazil—vugs in vein quartz, vugs in quartz pegmatite cores, and residual deposits. Hand methods are still practiced in remote parts of the country and where the bench system has been developed to such an extent that mechanical methods are impractical.*

Mechanical Methods in Use

Where the vains or quartz cores are reasonably flat lying and close to the surface, bulldozers or scrapers are used to remove the overburden, the loose top cover of the deposit, and the surrounding country rock. Hand drills or compressors and light jackhammers are used to drill holes in the massive quartz. These holes are so spaced that, when loaded with 40-percent dynamite and exploded, the vein or core is shattered in such a way that it can be picked loose without destroying the contained crystals. On steeply dipping veins or where the overburden is excessive, small shafts are sunk in the footwall and the vein is mined by the room-and-pillar method.

Some quartz veins resemble pipe

* Information on the current mining methods has been obtained largely from F. L. Knouse and R. D. Butler of the Foreign Economic Administration.

deposits. They are nearly vertical, and the outcrop is usually a small stringer that widens in depth to a vug containing crystals aligned approximately normal to the walls or loose in the clay of the vug. A shaft is sunk on this pipe by blasting until the vug is reached. The opening of the vug and the extraction of the crystals is done by hand mining.

The Swamp Deposits

Prospecting and mining the residual or swamp deposits follow a peculiar, although regular, pattern. The swamps, 400 to 1,500 meters long, 15 to 200 meters wide, and one-half to several meters deep, have been formed by ribs of hard gneiss which have dammed small streams. The quartz is found in oval or irregular patches of gravel 30 to 40 meters long and approximately half as wide, lying on the bed-rock, and overlain by 0.3 to 3 meters of clay, silt, and sand. There are no connecting links of gravel between beds. However, near the center, at the base of each bed, is a quartz stringer in the bedrock that is believed to be the source of the quartz in the gravel. The quartz crystals or fragments may be slightly rounded but for the most part are angular. It seems probable therefore that these deposits consist primarily of material weathered in situ.

The gravel beds are located and outlined by systematic traverses across the swamp, testing the bottom at intervals of 8 to 10 meters with a probing rod, consisting of an iron bar about 1 centimeter in diameter and 3 to 5 meters in length, drawn to a sharp point on one end. A stake is placed at the edges of the gravel beds on each traverse. After the beds have been outlined by stakes, a shaft is sunk at the center of each bed. If the gravel appears promising the deposit is blocked out by additional shafts, and a system of drainage ditches is laid out to drain the swamp. Mining by hand methods is begun at the lower end of the deposit, and the open drainage ditch across the bed forms the working face. As the face is advanced across the gravel bed the overburden of silt, sand, and clay is removed to nongravel areas. The crystals are sorted from the gravel by hand, and the waste is backfilled into the worked area.

Operations in the United States

The history of quartz-crystal mining in the United States provides no background of experience for mining radio-grade quartz. Individuals or pairs of miners using hand methods have roamed the Ouachita Mountains in Arkansas for the past 50 years in search of specimen and jewelry-grade quartz. A small quantity of radio-grade crystals was obtained from the Calaveras Crystal mine near Mokelumne Hill in Calaveras County, Calif., in 1924 and 1943 and from the Rough Diamond mine on an adjoining property in the latter year. In 1943 mechanized mining on a large scale was begun on veins of massive quartz in sandstone, slate, and shale in western Arkansas.

Two methods have been used. The first, which was used in 1943, was the mass removal of the overburden and the country rock from the vein by drilling, blasting, loading with power shovels, and transporting in dump trucks. When crystals were encountered at the face, they were mined by hand. However, the danger of blasting into crystals and the lack of continuity of the vein, which required the removal of a large volume of waste, made this type of mining uneconomical.

Separation of crystals from main masses requires patience and skill. Pieces showing promise are set aside for further examination

"Following the Lead"

Early in 1944 the second method of "following the lead" or mining only the vein and thus moving as little waste as possible was adopted at some properties. A caterpillar tractor or bulldozer was used to excavate the surface mantle, including the loose portion of the vein. A gasoline-powered compressor of 210 cu. ft. capacity supplied air for two blower-type jackhammers. Eight-foot holes drilled on 4-ft. centers along the strike of the vein were loaded with 40-percent dynamite. The charges, varying in size according to conditions encountered, were exploded electrically. A careful check of the cuttings was made to detect the presence of clear crystal quartz. The shattered vein material was removed by a gasoline powered shovel with a 40-ft. crane boom and a ½-cu. yd. excavating clamshell bucket equipped with six 9-in. chisel-point teeth. The guides for the tagline counterweight were lengthened to allow enough travel for excavation 60 ft. below grade. A careful check of the face and the excavated material was made to detect the presence of crystals or crystal-bearing clay. Several working places, at intervals of 120 to 130 ft. along the vein, were developed at the start to provide flexibility in the use of equipment. When crystals or clay pockets were exposed, the clamshell was stopped and the area cleaned by hand. If a pocket was not fully exposed, further drilling and blasting were done carefully. A lightweight paving breaker was sometimes used in tight places where blasting might injure the crystals.

Use of the "Scratcher"

The hand tools used to mine a crystal pocket consist usually of a long-handled, round-pointed shovel, a 6-lb. clay pick, a 6-ft. pointed bar, a putty knife for cleaning the faces of the crystals, and a "scratcher." The latter tool, developed by local miners, resembles a carpenter's wrecking bar 18 to 24 in. long, with the gooseneck straightened out to 90°, and the end fashioned into a sharp or chisel point. A pocket usually is mined by two men. It is cleared with picks and scratchers until the crystals or points appear. The crystals of varied shapes, sizes, and degrees of clarity are interlocked and oriented in every direction in the clay, and their separation requires patience and skill. The pick and

scratcher are used to pry and excavate, using just the right amount of pressure to loosen the crystal without breaking it. The material is roughly sorted at the face, and the individuals that show promise are saved for further examination. The waste is shoveled away from the face and removed by the clamshell.

Calcite Mining

Calcite veins may be free of overburden, but usually the outcrop consists of stained, fractured, and cloudy material. Vugs, joints, fractures, or swells in the veins are the most favorable localities in which to begin operations. Mining should be done by hand, using bars, light hammers, and chisels. Explosives should not be employed under any circumstances, as the slightest concussion may lead to the formation of cracks or cleavages, some of which may not develop until the material is being prepared for use.

A flashlight may be used to advantage in mining cave deposits. A large part of the light directed on flawed crystals is reflected by the fractures and inclusions, giving the crystals a bright, shiny appearance. Clear crystals permit the light to pass through and thus appear dull or dark. Only the dark crystals should be recovered. A light tap at the base or at the point of contact of the crystal and the wall will usually release the crystal.

Sources of Fluorite Crystals

Every fluorspar mine is a potential source of optical fluorite, and owners and operators should instruct the miners and the workers on picking belts to recover all clear material. Prospectors also should be aware of the value of optical-grade fluorite, because many of the best-quality crystals have been found in vugs close to the surface.

Preliminary Inspection Data

Quartz.—Preliminary inspection of quartz is concerned only with cleaning or removing the mineral stains, which are found on most of the material as mined, and the removal by rough trimming of imperfections that may be seen without the use of instruments. Much of the quartz has an opaque mineral coating, usually of limonite, and it may be necessary to chip it to examine the interior. Stained quartz should be scrubbed with a wire brush in warm, soapy water, immersed in warm oxalic acid for several days, and scrubbed again. If this does not produce satisfactory results, sand blasting may be effective.

Some rough cobbing or trimming may be done at the mine by skilled operators, who tap lightly with the sharp edge of a small hammer at the contact between the clear and cloudy or fractured portion of the crystal. After several complete circuits of the crystal are made, the fractured portion is broken off by a sharp blow of a larger hammer.

Calcite.—After the mined calcite is removed to the trimming shed, all colored or fractured material and pieces too small to meet minimum size specifications are discarded. Crystals coated with clay should be scrubbed in warm, soapy water. Only the most obviously flawed portions should be removed at this time. Cleaving should be done along the characteristic rhombohedral cleavage planes with a thin chisel or knife blade and a composition hammer. If incipient cleavage or internal iridescence, caused by pressure twinning, are present they may be identified by holding the crystal or fragment up to a strong light (sun or electric). Crystals or portions of crystals containing these defects must be discarded.

Care should be exercised in handling, stocking, and shipping calcite. The stocked material should be kept in a stable container, as vibration may enlarge incipient cleavage formed during the preliminary trimming. Each piece should be wrapped separately and compressed to prevent shifting during shipping. The interior of the case should be free from projecting nails and rough surfaces.

Fluorite.—Optically clear crystals constitute a very small part of the fluorite masses mined as the bulk of material contains fractures or inclusion or is off color. Inclusions are usually calcite, dolomite, barite, or quartz. As most of the crystal surfaces are dull it may be necessary to break off a corner to expose the interior in search of flaws. In doing this it is best to place the specimen on a wooden base and break off the corner along a cleavage plane by means of a knife blade or chisel. The direction of cleavage is usually apparent and if indistinct may be located by moistening the specimen with kerosene. Fluorite is almost as fragile as calcite and should be handled and packed with the same care.

PAIMEG Meets in Washington

GROWING interest in the Pan-American Institute of Mining Engineering and Geology was attested by the rather large attendance at its joint meeting with the Washington Section of the AIME at the Cosmos Club, February 28, 1945. An excellent program of general Pan-American interest was arranged by Dr. D. F. Hewett and presented under the chairmanship of Charles Will Wright.

The program presented was as follows:

Objectives and Trends of PAIMEG, by Marin Rodriguez, president of PAIMEG, Santiago, Chile.

Report on First Meeting of General Council of PAIMEG, Lima, Peru, December 3-10, 1944, by Edward Steidle, chairman.

Observation on Some of the Mineral Resources and Tendencies Towards Industrialization in South America, by C. W. Wright, Chief Foreign Minerals Specialist, U. S. Bureau of Mines. Discussion by Dr. H. Foster Bain and Joseph Singewald.

Current Iron and Steel Industry in Brazil, by H. J. Fraser and A. W. Newberry, Washington, D. C. Discussion by C. W. Wright and J. V. N. Dorr.

Business meeting. Report of secretary-treasurer, by Arthur T. Ward. Election of officers, Arthur T. Ward, in charge.

Comments on the Minerals Program of the Foreign Economic Administration in Latin America, by Alan M. Bateman, Metals and Minerals Division, FEA, Washington, D. C.

Importance of the Quartz Crystal Industry in the War Effort, by Carl Tolman, Robert D. Butler, both of FEA, and Richard Stoiber, Signal Corps, U. S. Army.

The Mercury Deposits of Mexico, by David Gallagher, U. S. Geological Survey, Washington, D. C.

First Generalized Geological Map of South America, by Dr. Victor Oppenheimer, Consulting Geologist, Lima, Peru.

Present Status of Geological Map of South America, by George Stose, member Geological Society of America, and Committee for Preparation of Geological Map of South America. Discussion by W. E. Wrather, Director, U. S. Geological Survey.

Dinner Meeting: Some Practical Aspects of Inter-American Relations, by Edward Steidle. Panel discussion led by M. D. Carrel, Projects Director, Inter-American Development Commissions.

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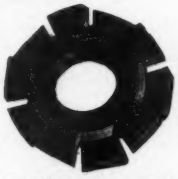
AMERICAN ROLLING RING CRUSHERS



Patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher.

The Rings have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at specific speeds. In contact with solid metal the rings are momentarily deflected from their usual course because they are free to swing back out of position. No shear pins or other safety devices that require attention.

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★ Installations like those pictured here are daily demonstrating the many advantages of crushing coal to stoker size with the American Rolling Ring Crusher—the unit that fully measures up to the job and relieves you of problem after problem. You don't have to buy a standard type—the unit you require is fitted to your need so that you can be equipped for greater range of reduction and for tonnage desired. In one operation run-of-mine or lump coal is reduced to sizes for unit pulverizers and automatic stokers through the splitting action of the patented reversible manganese steel SHREDDER RINGS. Each crusher is sold on a definite guaranteed performance basis.

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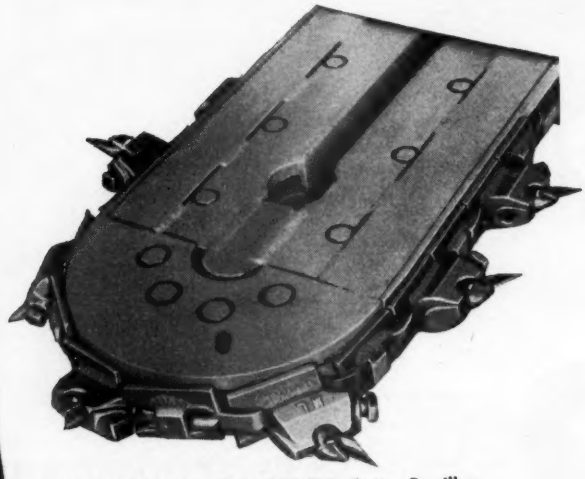

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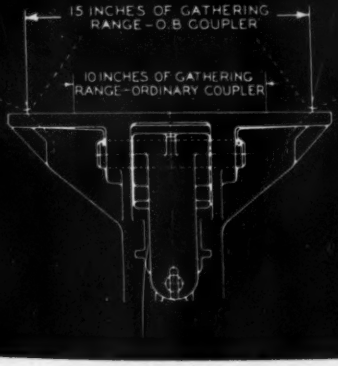

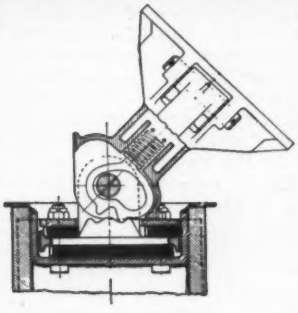

Springy rubber draft gears (colored areas) used on O-B Automatic Couplers will absorb up to 50,000 lbs. impact as compared with the 12,000 to 15,000-lb. capacity of steel draft springs.

For Top-Notch Haulage Performance Install O-B Automatic Couplers—A Coupler Designed Specifically to Meet Mine Operating Conditions

● Trying to adapt a standard railroad coupler to a mine car is like putting a round peg in a square hole. In mines, curves are shorter and coupling on curves more frequent . . . cars are smaller and overhangs greater . . . impact blows from surging are much more severe.

Knowing this, O-B engineers wiped their slate clean and started fresh, designing a coupler specifically to meet mine operating conditions. First to go was the traditional end-for-end design. More badly-needed gathering range could be provided with male and female coupler heads. Next, an automatic centering device was added to eliminate manual alignment of coupler heads, an important safety feature in keeping men out of the "danger zone." Third, breakable steel draft springs were replaced with non-breakable rubber draft gears of much greater shock absorbing capacity.

If you are considering the purchase of new mine cars, investigate the O-B Automatic Mine Car Coupler—a coupler designed specifically to meet mine operating conditions. A postcard inquiry will bring full information.

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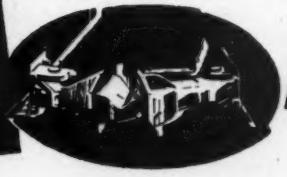

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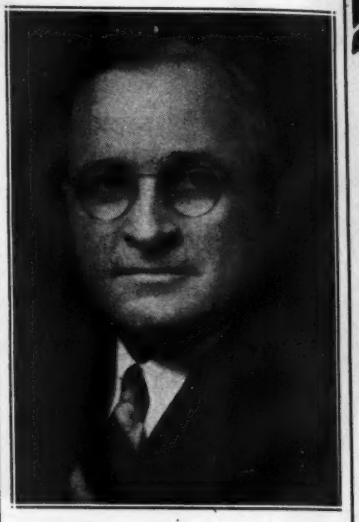
WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress



The thirty-third President of the United States, Harry S. Truman

A STRONG demonstration of the steadfast purpose of the executive, legislative and judicial branches of our Government was evidenced as our great war President passed from the scene April 12, in the immediate installation of President Truman as his successor at 7:09 p. m. that same day, and in the spontaneous pledges by all officials, Senators and Representatives, to carry on with the task that is before the Nation.

Present indications that the German phase of active hostilities is at an end, coupled with the realization that something constructive must be brought forth as the result of the United Nations Conference in San Francisco, have brought little of elation and much more of sobering thought to the hard working Congress and the staff officials of the executive departments and agencies of the Government in Washington. It is too soon to attempt to forecast what moves are forthcoming in tax legislation and numerous other reconversion procedures but by mid-summer the definite course of a program may be expected to be well outlined.

Foreign Trade Agreements

Determined opposition by minority committee members has marked the hearings which began April 18 before the House Committee on Ways and Means on the Doughton bill to extend the authority to negotiate Reciprocal Foreign Trade Agreements for three years and to reduce by 50 percent the rates of duty existing on January 1, 1945. Administration forces by personal appearance or by statement have staged an all-out approval of the bill. These proponents include former Secretary of State Cordell Hull, Secretary Stettinius, Assistant Secretary Will Clayton, Assistant Secretary Nelson Rockefeller, Commerce Secretary Henry Wallace, Director Fred Vinson of the Office of War Mobilization and Reconversion, Secretary of Agriculture Claude Wickard and U. S. Tariff Commission Chairman Oscar Ryder.

Mining industry witnesses voiced the first opposition and included Robert S. Palmer, secretary of the Colorado Mining Association; Otto Herres, vice president, Combined Metals Reduction Company, operating zinc-lead mines in Nevada, Utah and Idaho; Ernest V. Gent, secretary, American Zinc Institute; and O. W. Bilharz, president, Tri-State Zinc and Lead Ore Producers Association. Herres stressed the importance of non-ferrous metals to the national defense and emphasized the harmful effect of tariff reductions in connection with wages, unemployment, public relief and the loss of important markets for the products of industry. Gent recited the crushing experience of the zinc industry under the Canadian and Mexican trade agreements and demonstrated to the committee that the zinc duties now in effect are lower than under the Underwood Tariff Act of 1913.

The witnesses emphasized in their recommendations that the extension of the authority under the Doughton bill should be limited to one year, that the proposed 50 percent further reduction should be eliminated, that future trade agreements should be subject to congressional review, and that the escape clauses should be made mandatory in their application when a trade agreement injures an established domestic industry.

Still to appear are witnesses for the Lead Industries Association and the American Mining Congress.

Monetary Legislation

Desultory hearings are continuing on the Bretton Woods proposal before the House Committee on Banking and Currency and are expected to close about May 10. Meanwhile the support for the International Monetary Stabilization Fund continues to grow less and Treasury Undersecretary Daniel Bell has indicated his approval of the plan whereby the Fund resources would be restricted to short-term currency stabilization operations with the International Bank to handle the long-term commitments for economic and monetary reconstruction. No hearings on Bretton Woods have been held by the Senate Committee on Banking and Currency.

The Wagner-Spence bill, S. 510, reducing the gold reserve requirements behind Federal Reserve notes and deposits from 40 percent to 25 percent, has been approved by the Senate and is now subject to action on the House floor. It is anticipated that the measure will become law, including the amendments repealing the authority to issue Federal Reserve bank notes, requiring no gold backing, and the authority to issue $3 billion in "greenbacks" granted by the "Thomas amendment" to the AAA in 1933. Senator Edwin C. Johnson of Colorado made a determined effort on the floor of the Senate to amend the bill (1) hold the reduction of the gold reserve to 30 percent, (2) return the reserve to 40 percent at the end of two years, and (3) increase the price of gold from $35 to $56 an ounce. All three amendments were rejected.

Premium Price Plan

The House Committee on Banking and Currency resumed hearings April 24 on the Hayden-McFarland bill, S. 502, continuing the Premium Price Plan on copper, lead and zinc to June 30, 1946. Government officials, including representatives of OPA, Undersecretary of War Robert Patterson, Bureau of Mines Director R. R. Sayers, WPB Vice Chairman for Metals W. C. Keeley and others endorsed the continuation of payments under the Plan. Keeley and OPA General Counsel Field objected to the language in the bill which makes premiums noncancelable, contending that it is their intention to change the present 30-day cancellation provision on the B, C and special copper payments to 60 days. Field added that the "adoption by Congress of a provision requiring firm continuance of all classes of premiums might, we believe, result in an expenditure of public money beyond the amount necessary to achieve the purposes for which the Premium Price Plan was designed." Representatives Berkley Bunker (Dem., Nev.), Clair Engle (Dem., Calif.) and Richard Harless (Dem., Ariz.) appeared before the committee urging that S. 502 be reported and approved by the House in the form in which the bill passed the Senate. All of these members of Congress emphasized the importance of the non-cancelable feature of the bill as a real necessity to many producers in order that they may make the proper plans so essential to production.

The Committee has closed the hearings on S. 502 and is expected to report the bill in the near future.

Manpower Bill

Early in April the Senate rejected, 46 to 29, the compromise manpower control bill, following the startling statement in the report of the Office of War Mobilization and Reconversion that manpower legislation would be needed in the problems of reconversion as well as in war production. The Senate appointed conferees and sent the measure back to the House, where it has been referred to the Committee on Military Affairs; as a result of this latter action, the bill is considered dead.

"Intangible Drilling Costs"

Petition has been filed in the Fifth Circuit Court of Appeals in New Orleans for a rehearing of the F.H.E. Oil Company case, discussed last month, in which the Court held that the Bureau of Internal Revenue regulation allowing an option to deduct "intangible drilling and development costs" of oil and gas wells was invalid. The Bureau has advised former Representative Wesley E. Disney that it "proposes to continue to follow the provisions of Section 29.23(m)—16 of Regulations 111, and corresponding provisions of prior regulations notwithstanding decision in the case of F.H.E. Oil Company. In the event of a clarification of the law impelling such a change, in no event would such a change be retroactive unless so directed by Congress."

Percentage Depletion

The protest against the action of OPA in excluding percentage depletion on the monthly report forms for bituminous coal mines has resulted in an announcement from the Administration that it will return to the use of the cost reporting form for the bituminous coal industry which was in effect before January 1, 1945. As the result of this action bituminous coal producing companies may now report their depletion as before. OPA states however, that the return to the former method of reporting depletion will make no change in its policy with respect to price action, and that no greater depletion per ton will be allowed than was reported for each district in 1942.

The statement of A.M.C. Secretary Conover urging that percentage depletion be recognized as a cost item appears on page 65 of this issue.

Washington Highlights

CONGRESS: Pledges support to President Truman.

TRADE AGREEMENTS: Mining men testify at hearings.

BRETTON WOODS: House hearings nearing end.

GOLD RESERVE: Bill reducing from 40 to 25 percent close to enactment.

METAL PREMIUMS: House to act on Hayden-McFarland bill.

MANPOWER: Bill is dead.

DEPLETION: OPA tells coal companies to report percentage depletion.

COAL WAGES: New contract approved by OES Director Davis.

TRAVEL TIME: WLB directs open pit operator to negotiate payment.

WAGE-HOUR: Administration expands coverage of law.

BACK PAY: Claims are serious hazard.

Coal Mine Wages

William H. Davis, Director of Economic Stabilization on April 30 approved the bituminous coal mine wage contract signed by the operators and miners on April 11 and approved by WLB on April 23. Davis approved a price increase averaging 16 cents a ton. Providing an estimated average increase of $1.25 to $1.30 per day in basic earnings, the contract, effective as of April 1, will run until April 1, 1946, continuing indefinitely thereafter but subject to the right of either party to request a negotiating conference on ten days' notice.

Terms of the agreement include (1) a basic 9-hour day for inside workers, portal-to-portal, including a paid 15-minute lunch period staggered to prevent production interruption, with the first seven hours paid at $1 an hour, the eighth hour at time and one-half, and a flat rate of $1.50 for the ninth hour; (2) a flat daily increase of $1.07 to outside employes to equalize their earnings with those of inside employes, and a paid for 15-minute lunch period on a staggered basis; (3) shift differentials of 4 cents and 6 cents an hour for the second and third shifts, respectively, covering both inside and outside employes; (4) a change in classification of mobile loading machine rates, providing not less than a day rate of $8 and an hourly rate of $1.143 for drillers, shooters and loading machine helpers, except that where the basic inside day rate is less than $7 the rate shall be increased 14.3 percent; (5) a minimum rate of $9 per day, or $1.286 per hour for inside electricians or mechanics repairing loading and cutting machines, haulage locomotives, and conveyors, except that in any district where the base rate is less than $7.80 it shall be increased 15.4 percent; and (6) a vacation payment of $75, in lieu of the present $50, with the understanding that no vacations will be taken during 1945. The 7-hour day and 35-hour week are restored as the basis for pay calculations, but with full pay for travel and lunch time. Tonnage, yardage, deadwork and footage workers are to be compensated for travel and overtime beyond 7 hours a day by a payment equal to one-ninth of the individual's daily earnings, with the payment for the sixth day based on the earnings for that day. The "participating royalty" of 10 cents a ton and the demand for the unionization of mine supervisors were dropped.

Meanwhile the anthracite wage scale negotiations under way since April 4 have come to no agreement, and although the Solid Fuels Administrator has authorized operating for an additional month on a retroactive basis the miners have not entered the mines since May 1. The strike vote in the anthracite region as taken by the National Labor Relations Board polled 41,952 votes for striking and 6,977 against. The total number eligible to vote was 68,789.

Economic Stabilizer Davis has expanded the limitation for "fringe"

(*Continued on page* 89)

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Every American Tiger Brand Wire Rope comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the rope. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

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Personals

H. D. Sydenstricker, instructor, Mining Extension department, West Virginia University, resigned effective April 1 to become superintendent of No. 9x and 7 mines of the Carbon Fuel Company. He will move to Carbon about June 1. He has been in the Montgomery district for four years.

Malcolm B. Kildale, formerly assistant chief geologist for the International Smelting and Refining Company, Salt Lake City, Utah, has been appointed chief geologist for the company. He replaces **Vincent D. Perry**, who has been transferred to the Anaconda Copper Mining Company's staff.

Alfred Tellam, of Idaho Springs, Colo., has been placed in charge of the mining school recently opened in that city by the State Board of Vocational Education. The school has been initiated with the intention of giving the practical side of mining. Classes are being offered in mining and metallurgy with advanced work for those who desire it. Machinery and laboratory equipment have been installed for the use of the school.

John L. Auch, comptroller of the Pittsburgh Coal Company, has been elected vice president and comptroller, succeeding Ernest F. Rumpf, vice president, resigned, it was announced following the recent directors' meeting. Mr. Auch was appointed auditor of the company in 1939, was elected successively to assistant treasurer, treasurer and comptroller, the latter in August, 1941.

Marvin S. Walker of Leadville, Colo., has been promoted to the post of assistant chief engineer of the Climax Molybdenum Company at Climax, Colo.

Guy F. Rolland has been appointed director of Reynolds Experimental Laboratory, the explosives research facilities of Atlas Powder Company near Tamaqua, Pa., according to W. B. Blakey, director of Atlas' High Explosives Manufacturing Division.

J. O. Raick, a consulting mining and metallurgical engineer, who came to the United States at the time of the French collapse, is now associated with the headquarters staff of the Kaiser Company, Inc., at Oakland, Calif. He is a native of Belgium and was formerly employed in a consulting capacity with the Bethlehem Steel Company and the Lone Star Steel Company.

Arthur B. Van Buskirk, vice president and director of the Mellon Securities Corporation, was elected a director succeeding the late **J. B. L. Hornberger.**

J. F. Joy, who for the past four years has acted as senior ordnance engineer, office Chief of Ordnance,

War Dept., Washington, D. C., has been made vice president in charge of engineering for the Federal Machine and Welder Co., Warren, Ohio.

Sheffield Steel Corporation has announced the appointment of **Alfred B. Egan** to the position of District Manager, Chicago district, effective February 1. Mr. Egan has been with Sheffield 16 years. Since 1942 he has been in charge of Sheffield's Washington, D. C., office.

Richard M. Belliveau, engineer for the Winston, Morrison, Utah Constructors in Minnesota, has been transferred to Smackover, Ark., as consulting engineer with Winston Haglin. Mr. Belliveau came to Minnesota from Arizona in 1943 after having had charge of many large open-pit mine operations in the southwest. In Minnesota he was project manager of the Embarrass mine stripping program at Biwabik.

Noah D. Howard, who has been chief engineer for the Eastern Coal Corporation at Stone, Ky., was recently appointed manager of Hazard Splint Coal Company and Premium Coals, Inc., at Premium, Letcher County, Ky.

R. M. Magraw, formerly general manager of the Potash Company of America at Carlsbad, N. Mex., from which position he resigned last fall, is now in Denver, Colo., where he has established consulting offices.

B. D. Harden, reduction plant superintendent with Basic Magnesium Inc., of Las Vegas, Nev., since November, 1941, is now general superintendent of the alumina plant operations in Salem, Oreg., for the Chemical Construction Corporation.

James Wallace Smelker, a recent graduate of Ohio State University with a bachelor's degree in mechanical engineering, and **John H. Stang**, also a graduate of Ohio State University and formerly an assistant in the Department of Mechanical Engineering at that school, have been appointed to the staff of Battelle Memorial Institute, Columbus, Ohio. Both have been assigned to the division of fuels research.

Charles H. Hayes, for the past year chief of the compliance division, was recently appointed assistant to the Deputy Solid Fuels Administrator, and **Thomas J. O'Brien**, formerly assistant general counsel, succeeded Mr. Hayes as chief of the compliance division.

Mr. Hayes entered Government service in 1938, and Mr. O'Brien in 1937.

James H. Buchanan has been named manager of the newly created Chicago district sales office of the Atlas Powder Company's explosives department, it was announced on April 1. The new Chicago district will include the states of Illinois, Wisconsin, Minnesota and most of Indiana. The offices will be in the Field Building, 135 S. LaSalle Street, Chicago 3, Ill.

Joseph A. Corgan was recently elevated to the position of chief of the anthracite and coke section of the Economics and Statistics service of the U. S. Bureau of Mines. Following graduation at Pennsylvania State College as a mining engineer he was successfully engaged in anthracite sales for the Hudson Coal Company, was combustion engineer for the District of Columbia, and joined the Bureau of Mines in 1940.

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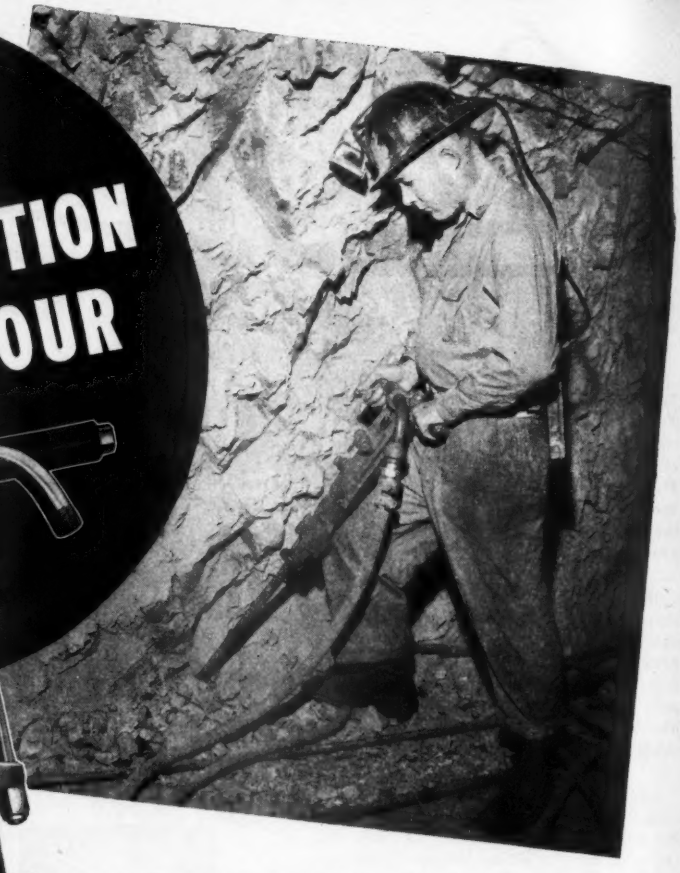

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Merrill E. Shoup, president of the Golden Cycle Corporation, Colorado Springs, Colo., and other companies, discussed gold from a national and international standpoint at the regular March luncheon meeting of the

Mining Association of the Southwest. Mr. Shoup is one of the foremost exponents of gold mining in the United States and his discussion included various aspects of the Bretton Woods conference and the outlook for a return to the gold standard.

F. C. Nicholson, who has been chief electrical engineer of the Glen Alden Coal Company of Scranton, Pa., has succeeded the late Harry M. Warren, chief engineer for the company. Mr. Nicholson began his electrical work in the coal industry in 1913 with the Lehigh and Wilkes-Barre Coal Company. He was appointed electrical engineer in 1918 in which capacity he served through the merger with the Glen Alden Coal Company in 1930.

William W. Adams, Bureau of Mines authority on accident statistics who advanced from junior clerk to head of the division he helped institute 34 years ago, retired on February 28, 1945, as chief of the Bureau's Accident Analysis Division. Mr. Adams has been in Federal service 38 years, the last 34 continuously with the Bureau of Mines.

Clark M. Groninger, of Baltimore, Md., coal traffic manager of the Baltimore & Ohio Railroad, has accepted an appointment as Assistant Deputy Solid Fuels Administrator for War in charge of transportation. Mr. Groninger, who has already assumed his new duties in Washington, was given a leave of absence by the railroad for an indeterminate period. He succeeds Fred K. Prosser, coal traffic manager of the Norfolk & Western Railway, who resigned to resume his railroad duties at Roanoke, Va., after serving with the Solid Fuels Administration for more than a year.

The appointment of Charles White Merrill, mining engineer, as chief of the Metal Economics Division of the Bureau of Mines was announced April 24 by Dr. R. R. Sayers, Director. Associated with the Bureau since 1928, Merrill has served as supervising engineer of the Bureau's Economics and Statistics office at San Francisco since 1933. He succeeds Thomas H. Miller, who recently was made assistant chief of the Bureau's Economics and Statistics Branch.

L. Thayer Lyon has been elected president of the Reliance Coal Mining Company of Pittsburgh, Pa., succeeding John B. Moore who died recently. Mr. Lyon was formerly vice president of the company. James G. Marks is secretary; David R. Morris is treasurer and assistant secretary and E. E. Beardsley is assistant treasurer.

Raymond J. Morgan of the Hudson Coal Company, who has been assistant colliery superintendent at Eddy Creek colliery, has been transferred to the Olyphant colliery as assistant superintendent to fill the position vacated recently by John D. Cooner. Mr. Morgan began his services with the company in 1916. Henry H. Null, formerly inside foreman at Eddy Creek Colliery of the Hudson Coal Company has succeeded Mr. Morgan as assistant colliery superintendent.

Frank J. Peternell has been appointed safety engineer for the Union Pacific Coal Company at Rock Springs, Wyo. He replaces R. R. Knill, who resigned recently to go into other work.

Directors of Hercules Powder Company at their annual organization meeting March 28, reelected all officers of the company as follows: Charles A. Higgins, president and chairman of the board; Leavitt N. Bent, Petrus W. Meyeringh, Edward B. Morrow, Anson B. Nixon, and Philip B. Stull, vice president; Raymond N. McAdams, secretary; and Francis J. Kennerley, treasurer.

The directors also reelected the Executive Committee, Messrs. Higgins, chairman; Bent, Meyeringh, Morrow and Nixon.

W. Gaylord Warren, who has been chief metallurgist of the Charcas Unit of the American Smelting and Refining Company in Mexico, is now on the metallurgical staff of the Golden Cycle Corporation at Colorado Springs.

John D. Cooner, former assistant colliery superintendent of the Olyphant colliery of the Hudson Coal Company has succeeded W. C. Metzger as safety engineer. Mr. Cooner was appointed assistant mine foreman in 1917; was later engaged in mechanical mining development for the company and was later assistant chief engineer and safety inspector. In 1939 he was appointed assistant superintendent at the Olyphant colliery.

— *Obituaries* —

Charles Lewis Crockwell, 74, in charge of the Honerine and Black Diamond mines for Bullion Coalition Mines Company, at Stockton, Utah, died January 22 in Salt Lake City, Utah.

Eugene C. Tousley, 78, organizer of the original Sunshine Mining Company in 1913, died in Spokane, January 28. He made the original acquisition of the Coeur d'Alene property which later became the Sunshine mine.

Jack Dalton, 89, who blazed the famed "Dalton Trail," from Haines to Selkirk and Five Finger Rapids on the Yukon, died December 16 in San Francisco.

A. Brooks Fleming, Jr., 62, an official of the Consolidation Coal Company, died February 7, at Fairmont, W. Va. He joined the old Fairmont Coal Company in 1905, which later consolidated with other firms to form the Consolidation Coal Company. He was director of the company's employment service.

Douglas Gorman, 62, president of the Cumberland Coal Company, of Tucker County, W. Va., died January 29 in Baltimore. Mr. Gorman was one of the organizers of Bituminous Coal Research, Inc., and was in many ways active in sponsoring the general advance of the coal industry.

William G. Metzger, 65, nationally known for his quarter century of safety work with the Hudson Coal Company, of Scranton, Pa., died February 16, at Scranton, Pa. He was editor of *The Safety Commentator*, monthly publication of the Hudson Coal Company, and was at one time chairman of the mining section of the National Safety Congress.

Harry M. Warren, 69, chief engigineer of the Glen Alden Coal Company, died February 3, at Scranton, Pa. He became consulting engineer for the Glen Alden Coal Company as well as the Lackawanna Railroad in 1921. In 1932 he was named chief engineer of the Glen Alden Coal Company and was also electrical engineer of the Keystone Mining Company. He served on the United States Fuel Administration in World War I and was a member of a commission named by President Theodore Roosevelt to study mining in Europe prior to that. He pioneered in the introduction of the use of electricity in mining anthracite as well as the development of fine size anthracite for power production.

Oscar Stinson, 60, foreman at Enos mine of the Enos Coal Mining Company at Oakland City, Ind., died February 21, at Petersburg, Ind.

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NEWS and VIEWS

John Odell of Fairmont, W. Va., exhorts his fellow miners to boost coal production for more TNT to blast Tokyo. He has made over 100 such signs since Pearl Harbor.

—*Hamilton Wright Photo*

Eastern States

Gimbels in Philadelphia Will Sell Coal

Gimbel's big department store, Philadelphia, announced in a full page newspaper advertisement that it will take orders for "Coal in Modern Form," the "White Glove Packaged Fuel" of the Blaw-Knox Company. This fuel will be delivered in 3 by 6 by 9 in. cartons, and it is made of 80 to 85 percent anthracite fines, the remainder being bituminous coal and an asphalt binder. Blaw-Knox advises that even though Gimbels will sell their fuel, their policy of offering agencies to Philadelphia retailers will still be maintained. A plant in the Philadelphia area will soon begin to produce the new fuel.

Draft Will Take More Anthracite Workers

The anthracite industry faces another loss of around 1,400 currently deferred workers under drastically revised Selective Service regulations, it is now learned.

In addition to military induction of 1,400 of the 2,000 physically fit anthracite workers now deferred as essential to the war effort, the industry also stands to lose an estimated 1,000 men who are in 1-A.

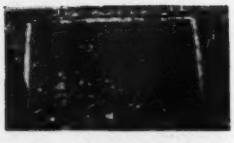
The foregoing regulation, together with a directive from Washington that Eastern coal area consumers will have to get along with 80 percent of their normal fuel requirements during the 1945-46 heating season, forecasts a production-consumer problem for next winter even more serious than during the season just ended.

Owen E. Williams, regional representative of the Solid Fuels Administration for War, said that consumers of anthracite in the anthracite area will be subject to the 80 percent requirement during 1945-46. Until this time regional anthracite consumers were not subject to that restriction.

Knickerbocker Mine Fire Extinguished by Flooding

Current reports concerning the mine fire in the Knickerbocker mine of the Philadelphia & Reading Coal & Iron Company indicate that it is now extinguished. The fire was discovered in November, 1944, and a futile attempt was then made to extinguish it by direct fire fighting methods. The mine was later flooded and the dewatering commenced in January, 1945. An inspection of the fire section after being dewatered showed no evidence of fire, hence mining started and now continues. The miners employed in the mine are gradually returning to their working places.

Stevens Coal Co. operation, Shamokin, Pa. Caterpillar D8 tractor and Athey mobiloader loading coal and rock mixture (previously wasted) into 16-yd. Athey wagons which haul to preliminary separation plant



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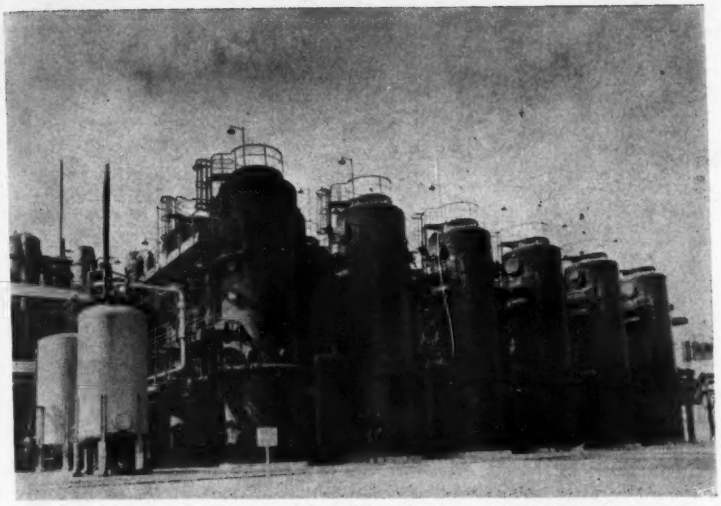

Plant at Institute, W. Va., owned by DPC and operated for Rubber Reserve Co. by Carbide and Carbon Chemicals Corp., produces butadiene—the principal ingredient of GR-S synthetic rubber

A New Fan for Newkirk Colliery

The Philadelphia & Reading Coal & Iron Company has installed, at its Newkirk colliery near Tamaqua, a 100,000 cu. ft. Jeffrey Aerodyne ventilating fan driven by a 75 hp. explosion proof motor. Run-of-mine from this colliery is precleaned in a cleaner located around 200 ft. from the mouth of the Newkirk Drift, after which it is shipped to the St. Nicholas central breaker for final preparation.

Bethlehem Sells Properties in West Virginia

Bethlehem Steel Corporation in 1944 disposed of virtually all its coal properties in West Virginia, according to President Eugene G. Grace's annual report to stockholders. The corporation sold all remaining coal properties in Morgantown, W. Va., all of its undeveloped coal properties in Kanawha County, W. Va., and part of the properties in Fairmont, W. Va. The report showed the corporation now has coal properties equipped for operation in Ellsworth, Johnstown, and Marianna, Pa., and Fairmont, W. Va. Undeveloped properties are located in Cambria, Blair and Bedford Counties, Pa.

Bethlehem last year also sold its Coatesville, Pa., and Bayonne, N. J., plants, as well as the land occupied by the shipbuilding yard at Alameda, Calif., according to the report. The corporation also made extensive purchases in 1944. All of the outstanding shares of American Well and Prospecting Company of Texas, and the Pacific Coast Forge Company of Washington, were bought. Since the start of 1945, the corporation has purchased the Petroleum Equipment Company and Petroleum International, both of California, and has acquired full control of Buffalo Tank Corporation of New York.

In 1944, its wholly-owned Mexican subsidiary acquired certain iron ore concessions in Michoacan and Guerrero, Mexico, including concessions covering substantially all of the iron ore which was covered by the concessions formerly owned by the corporation, titles to which were ordered forfeited by the Mexican Government.

The Carbide and Carbon Chemicals Corporation acquired approximately 6,500 acres of coal land from the Bethlehem Steel Corporation on December 21, 1944. This land was conveyed by Penn-Mary Coal Company to Bethlehem Mines Corporation by deed dated July 21, 1924. The Bethlehem Mines Corporation was merged with and into the Bethlehem Steel Corporation on February 26, 1936.

The tract of land is located on the head waters of Bell Creek, Shadrack Fork of Hughes Creek, Five Mile Fork of Kelly's Creek, Hurrican Fork of Kelly's Creek, Morris Fork of Blue Creek, Laurel Fork of Bell Creek and along Rock Camp Fork of Bell Creek, largely in the county of Kanawha, but in part of the counties of Clay, Nicholas and Fayette.

The coal beds were tested by diamond core drilling last summer. The rocks belong to the Allegheny series and the Kanawha group of the Pottsville series.

Beckley Meeting Features Electrical, Mechanical and Employment Problems

A joint meeting of the American Institute of Electrical Engineers (West Virginia Chapter) and the New River and Winding Gulf Electrical and Mechanical Institute was held at Beckley, W. Va., on April 12, 1945. At the afternoon session, which was attended by about 150 men, C. C. Ballard of the New River Company presided as chairman and an interesting program was presented as follows:

"Interrupting Capacity of Both Air and Oil Circuit Breakers" by L. W. Scott, Industrial Engineer, General Electric Company.

"Pre-Employment, Supplementary, and Supervisory Training of Island Creek Employes" by L. H. Winger, Supervisor of Employment and Training, Island Creek Coal Company.

"Grounding" by D. E. Renshaw, Industrial Engineer, Westinghouse Electric and Manufacturing Company.

"Mine Haulage" by John S. Beltz, Chief Engineer, Mining Department, Jeffrey Manufacturing Company.

(Copies of these papers will be published in coming issues of MINING CONGRESS JOURNAL).

The night session had an attendance of nearly 500. L. Ebersole Gaines, president, New River Company, presided. H. R. Huntley, Engineer, American Telephone and Telegraph Company, talked on "Recent Developments in Inductive Coordination" and demonstrated the effect of induced currents by a set up of apparatus on the stage. His subject was discussed by F. R. Frishette, Superintendent of Substations, Appalachian Electric Power Company.

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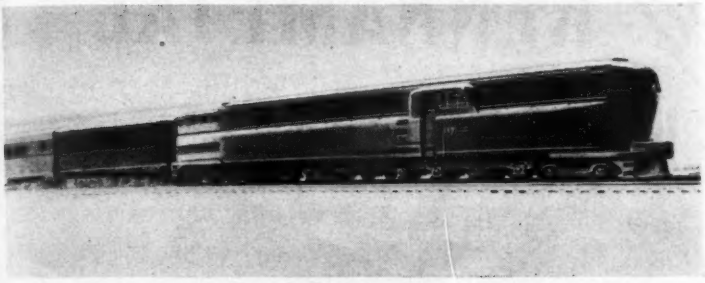

The new locomotive will develop 6,000 hp. delivered from steam turbine to generators to driving motors

A NEW and revolutionary streamlined locomotive—a steam-turbine-electric—one of three ordered by the Chesapeake & Ohio Railway, is to be built by Baldwin Locomotive Works and Westinghouse Electric & Manufacturing Company. This locomotive embodies the best features of steam, turbine and electric drive, and is said to be capable of speeds of more than a hundred miles an hour under full load with high sustained speeds even on grades. The coal supply is carried in the head of the locomotive instead of the tender. The boiler is situated in the center section behind the engineer's cab. The electric motors, which drive the wheels, are in the rear.

The Chesapeake and Ohio Railway on March 28 asked WPB permission to build these three powerful coal-burning locomotives. No electrically driven locomotive powered by steam turbine is in operation on any railroad in this country today. Each of these new locomotives will combine in a single self-contained independent unit the advantages of speed, continuous power and smoothness of operation that, with other types of fuel and comparable horsepower, have heretofore been achieved only in multiple units—two or more complete engines connected together.

Baldwin already has completed the basic designs and will build the new motive power in cooperation with C. & O. mechanical officers. C. & O. engineering personnel is collaborating with Baldwin in completion of design details. The steam turbine and electrical equipment, required by C. & O. as integral features, are designed and will be built by Westinghouse.

In horsepower per self-contained power unit this turbine-electric locomotive will surpass by two to three times the most powerful Diesel locomotive yet built. In uniform flow of power at all speeds it will fully match any self-propelled motive power now operating on rails. The electrical transmission assures unsurpassed operating flexibility, rapid acceleration, and imperceptible starting under heavy load.

Experience with public utility, Naval and Merchant Marine power installations has shown substantially greater reliability of steam turbine over Diesel engine power under sustained use, and our engineers are confident this new locomotive will confirm on rails the same superiority of performance. Moreover, ample engineering experience justifies our expectation that maintenance costs per 1,000 gross ton-miles hauled will be considerably less for this turbine electric locomotive than for equivalent Diesel horsepower.

The cab will be near the front end of the locomotive giving the engineer a protected location with excellent forward vision. The coal supply will be carried at the head end of the locomotive instead of in the tender, as at present. The boiler will take up the center section behind the engineer's cab. The steam turbine and electric generators will be placed at the rear and will feed 4,000 kilowatts of electricity—enough for all of the electric power needs of a town of 5,000 population—through motors mounted on each of the driving wheels.

Carl E. Newton, president of the Chesapeake and Ohio, in speaking of the new giant, said:

"We believe this locomotive marks a distinct technological improvement over all existing types of steam and Diesel road locomotives and that when put in operation it will prove to be fully competitive with any self-contained motive power now hauling trains on rails anywhere. In addition, it utilizes coal—the nation's cheapest and most abundant present and future source of energy.

"Each of the separate engineering elements combined in this new locomotive has been thoroughly proved. Therefore while these locomotives will embody the most progressive applied engineering thought, and nothing like them has ever been built before, we do not classify them as experimental. We are in fact building them for the specific purpose of powering separate sections of a projected new C. & O. streamlined train which will be built as soon as critical materials and manpower become available. Pending construction of the cars, however, we plan to press the locomotives into troop carrying service as soon as they are completed.

"In addition to the radically new design and application of engineering principles in combination, and other technological improvements, the new locomotives will be streamlined to harmonize with the appearance of the projected new cars."

All the persons pictured above contributed, through numerous processes, to the production of the small but important quartz wafer shown. Quartz crystals are indispensable to military communications

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Kennametal Undercutter Bits increase the lineal footage that can be cut without stopping operations for bit replacement. They can be resharpened a score or more times, thereby effecting substantial reductions in tool costs. Their use reduces power consumption per footage cut, and makes possible operations where previously they were impracticable.

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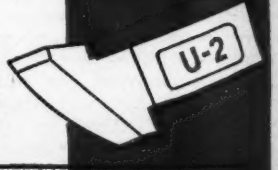
1⅜" fixed gage—for Goodman Numbers 50, 52, and 54 cutter chains.



U-4

At 1⅛" gage—for thin cutter bars; and at 2" gage—for thick cutter bars on Cincinnati, Goodman, Jeffrey, Prox, Tracy, and Sullivan cutter chains in track and mobile machines.

Wheels of Government

(*Continued from page 77*)

awards to provide that (1) shift differentials in industries with necessarily continuous operations may be granted with limits of 4 cents an hour for the second shift and 6 cents an hour for the third shift; (2) adjustments higher or lower than these limits for such continuous operation, or limits provided in the March 8 order for vacations and for shift differentials in non-continuous operations, may be approved where the Board finds them consistent with "clear and well-defined" industry or area practice; and (3) other non-basic wage adjustments or changes in working conditions affecting earnings "may be approved where WLB finds an established substantial industry or area practice, the extension of which to the particular case would not be unstabilizing to the industry or area, or where the adjustments are equitably required to meet unique situations and consequently would not be precedent-making."

Travel-Time Pay

The implications of previous travel time pay awards may be seen in a recent WLB order directing that in an open-pit metal mine operation the mining company and the unions involved are to negotiate and determine (1) the amount or the method of determining the amount of travel time; (2) designated points for going on and off duty; (3) rate or rates of payment for travel time; and (4) any other related issues. WLB also stipulated that in the event no agreement is reached within 30 days the unsettled issues are to be referred to the Non-Ferrous Metals Commission (WLB) at Denver, Colo.

Announcement has been made by the Wage and Hour and Public Contracts Divisions of the U. S. Department of Labor that "the minimum wage and overtime provisions of the Fair Labor Standards Act are regarded as applicable to employes engaged within a state in the production of goods to be used within the same state in carrying on interstate commerce." The Wage and Hour Administrator further states that the production of goods for interstate commerce is now considered to include "such activities as producing ice, electric energy, railroad ties, crushed rock, bituminous aggregate, ready-mixed concrete, telephone and telegraph poles, or other similar items for use or consumption wholly within the state by interstate railroads, telegraph or telephone companies, etc., in carrying on interstate transportation or communication; or for use or consumption within that state in the maintenance, repair, or reconstruction of essential instrumentalities of interstate trade, commerce, transportation, transmission, or communication."

"Back-pay claims" resulting under the Wage-Hour Act continue to be a serious matter for employers. The U. S. Supreme Court has ruled that the Fair Labor Standards Act precludes a settlement in which the employe executes a release from any additional claims for overtime wages, the case in point being one in which a former watchman sued for a similar amount to that already paid him (and for which he had given a release), designating the amount sued for as "damages." The Court granted the "damages" and also attorney's fees.

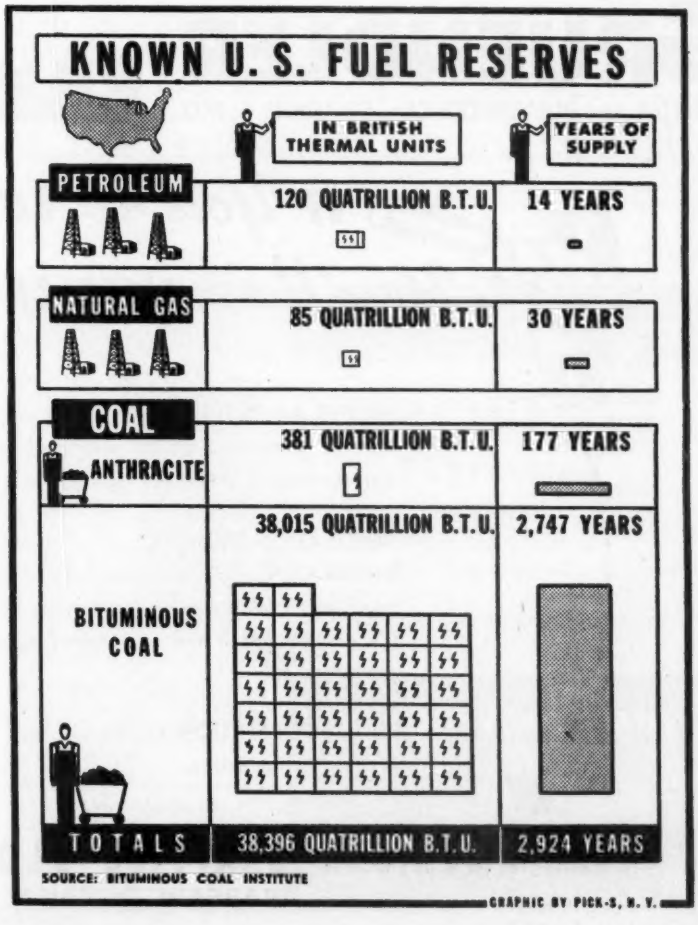
BOOK REVIEW

ALUMINUM, *An Industrial Marketing Appraisal, by N. H. Engle, H. E. Gregory and Robert Mossé, Bureau of Business Research, University of Washington, Seattle.* 494 pp. with appendix, references and index. Published by Richard D. Irwin, Inc., 332 S. Michigan Ave., Chicago, Ill.

An extensive appraisal of the aluminum industry, considering factors affecting production—raw materials, power, labor, capital and management. It evaluates the world's bauxite reserves and shows how dangerously low the position of the United States is, concluding that we will become a "have-not" in aluminum unless the refining of clays proves practicable. The alumina-from-clay situation is discussed and an analysis is given of electric energy requirements (and availability) for aluminum production from clay sources.

Part II covers the aluminum industrial structure and is most complete in its survey of the production costs of pig and contributing factors throughout the world.

Aluminum markets are discussed frankly and without bias. Full recognition is given the competitive position of steel, magnesium and plastics. Mining machinery does not offer a very promising field with one estimate at 200,000 to 300,000 lb. per year. The industry is examined in detail from mine to market, the data on bauxite are summarized and a program offered to safeguard the raw material lifeline of American aluminum.



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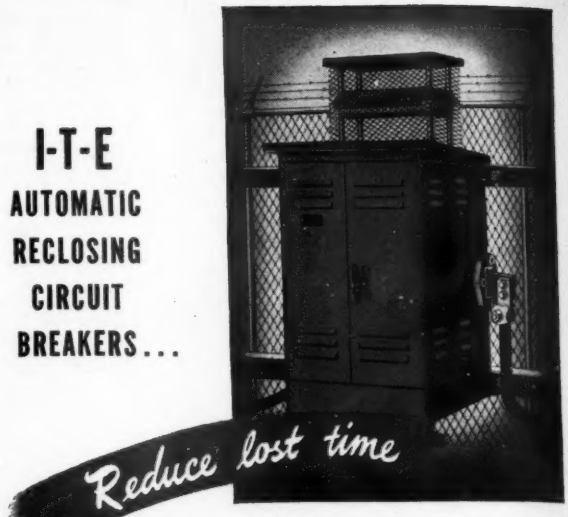

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Representatives in Principal Mining Areas

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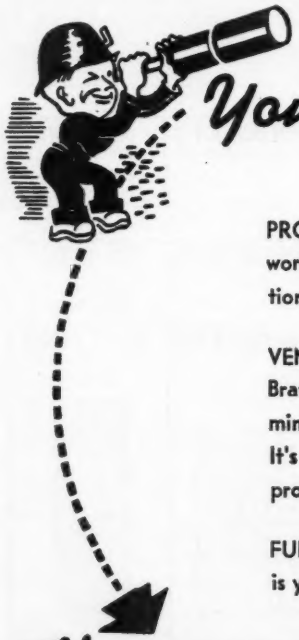

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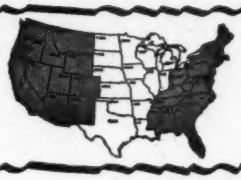

Eagle-Picher's New Name

Approval of a name change for The Eagle-Picher Lead Company was voted March 27 at the annual meeting of the shareholders of that company in Cincinnati. J. M. Bowlby, president, announced that the company is to be known as The Eagle-Picher Company.

The word "Lead" was dropped from the name because the management felt that it restricted the public concept of the scope of the company's activities. For many years Eagle-Picher has engaged in the manufacture and sale of numerous products that are not made of lead, it was pointed out.

Eagle-Picher has long been a major factor in the mining and smelting of zinc and an important producer of slab zinc and zinc oxides. Slab zinc is needed for galvanizing iron and steel; zinc oxides are used for the manufacture of paints, rubber, chemicals, enamelware and glass. In addition to producing these two important metals, Eagle-Picher is one of the largest and oldest fabricators of mineral wool insulation for home and industry.

No transferrals of personnel are involved in the name change to The Eagle-Picher Company. Unaffected by the change are two wholly owned subsidiaries, The Eagle-Picher Mining & Smelting Company, and The Eagle-Picher Sales Company.

Coal Stripping Legislation

It is reported that there are now three bills dealing with strip mining before the Conservation Committee of the Ohio State Legislature and that a subcommittee has been urged to incorporate the favorable features of all three measures, along with any new ideas they may have obtained from recent hearings, into a substitute bill. The subcommittee has been named to prepare a bill which would regulate strip mining and at the same time would not hinder production of coal.

Governor Frank J. Lausche attended the meeting to listen to arguments for and against the strip mining proposals. R. L. Ireland, Jr., of Cleveland, president of the Hanna Coal Company and of the Ohio Coal Association, spoke for more than an hour against the measure. He pointed out that 10,000,000 tons of coal were taken from the ground last year by strip mining and urged the committee not to discriminate against the coal industry or interfere with property rights. The measures were also opposed by several other speakers who contended that the hill country of eastern Ohio is worthless except for strip mining and that revenues from this industry are responsible for funds now received to operate schools and public offices in several counties. George A. Strain, formerly head of the State Department of Industrial Relations, opposed the bill on the grounds that it could cause unemployment among the miners. Despite manpower shortages in the past five years 15 Ohio companies have done considerable rehabilitation work and have put in over three and a half million trees, some 26 lakes have been constructed, and 21 of them have been stocked with fish.

A Program of Research Education

TO HELP America maintain its top-flight position in science, an expansion of Battelle Memorial Institute's program of research education is being planned, Clyde Williams, Battelle director, announced today. Mr. Williams pointed out that the program will be of special interest to returning veterans who can qualify for training as research workers in the sciences.

The program, which will be directed at the graduate level of education, is an expansion of the plan which has been markedly successful thus far with Ohio State University.

"America has been so busy in the last five years applying the old familiar laws of nature to military purposes that we have had too little time for discovering new scientific laws. Building new post-war industries and products for mass consumption depends on a steady flow of new basic knowledge. Furthermore, this new knowledge is vitally important for national preparedness in the future. Battelle's expanded plan of research education, built on 15 years of experience in this field, is designed to add to the country's store of scientific knowledge, as well as to train young scientists."

Thousands of veterans have become

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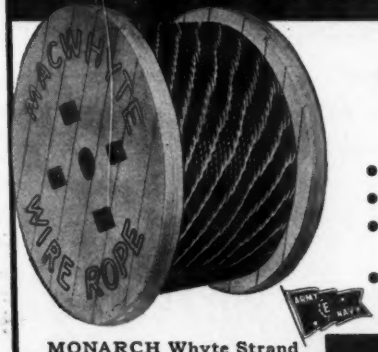

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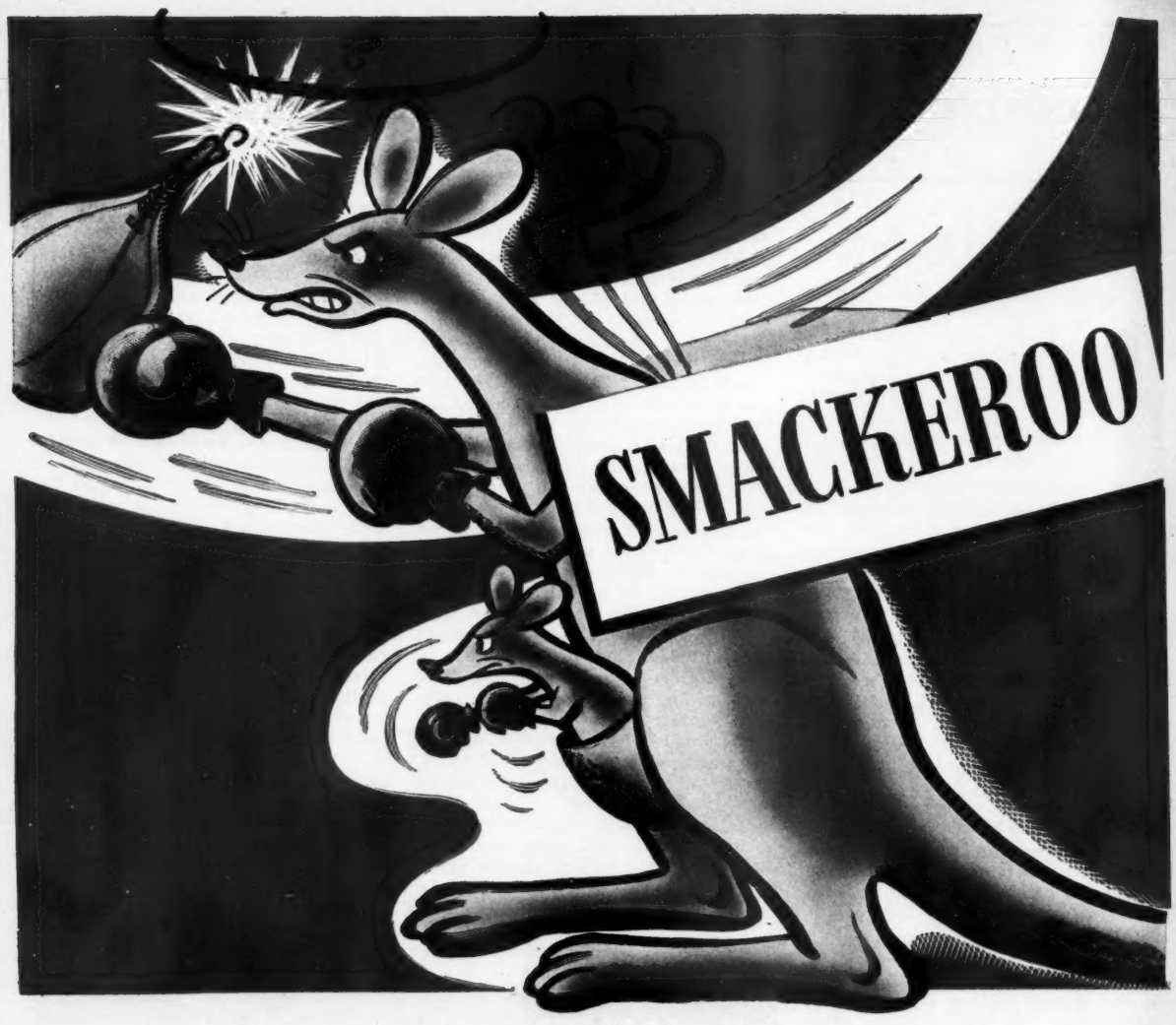

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aware of the importance of technology from their battlefield experiences and will be interested in scientific or engineering careers. They are learning that scientific manpower is one of the country's key assets, and that the supply of such men is now, and will remain for years, critically short. Battelle Institute, in cooperation with other educational institutions, Williams declared, will give qualified veterans the finest possible training in scientific research on the professional level.

"Research education," said Williams, "is a familiar field for Battelle Memorial Institute. Hundreds of research men have been trained at Battelle, and many of these have carried its methods into the research laboratories of industry and into universities, government bureaus, and other scientific organizations throughout the country. The first Battelle fellowship was granted in 1930 and fellowships have been granted annually since that time. Another phase of Battelle's research education is the publication of the results of scientific research. These publications now total 10 complete books, contributions in others, and more than 800 scientific papers and technical articles."

New Strip Mine Near Jasonville

Open pit operations at a new strip coal mine to be known as the Linton No. 28, near Jasonville, Ind., are expected to begin about September 1, according to Hugh B. Lee, vice president and general manager of Maumee Collieries Company, who will operate the mine. When in production, monthly capacity will be 60,000 tons of bituminous coal per month.

One of the world's largest draglines will be installed. It will have a 180-ft. boom, a 25-yd. drag bucket, and will handle a 130,000-lb. combined weight of bucket and full load. The dragline will be the walking type and will be powered by machinery totaling 7,000 hp., which is now being manufactured by the General Electric Company. Latest type amplidyne control will be included and two heavy-duty, multi-unit motor-generator sets, arranged for variable voltage operation will supply power for main motions. Total weight of dragline will be 2,410,000 lb. and walker stride will be 7½ ft.

Dines Company Buys Tar Creek Mines

The Federal Mining and Smelting Company, late in February, sold its Tar Creek mining property to the Dines Mining Company, according to announcement by L. G. Johnson, of Baxter Springs, who is district superintendent of the Federal Company. The Federal Company has also temporarily suspended mine operations at adjacent mining properties including the Muncie, Semple and Early Bird and has transferred crews from these operations to its mines on the Joseph Buffalo property. These

—*Hamilton Wright Photo*

Five-year-old Scotch pine growing on a spoil bank reforestation project near Oakland City, Ind. A number of coal companies are planting hardwoods and pines to augment America's diminishing timber supply

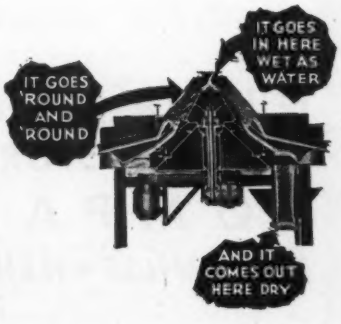
The "C·M·I" CONTINUOUS CENTRIFUGAL

Dewaters granular materials such as the finer coal sizes at a lower cost per ton than any other known method or machine.

And, the dewatered product is in such a physical condition that freezing, clogging of spouts, bins and cars is almost prohibited.

With the liquid being forced through a fine screen by means of the centrifugal forces, the "C-M-I" may be so arranged that considerable amount of the semi-colloidal fines are discharged with the liquid, or arranged so that most of these fines may be recovered.

Our engineering staff will appreciate having the opportunity of going into the details of your drying problems.



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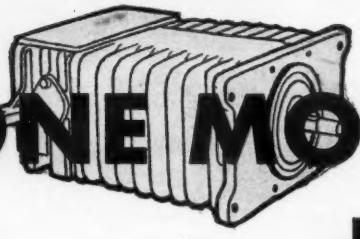

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include the Maxine, Walker and Buffalo forties about midway between Picher and Quapaw. These are the properties which were closed following the burning down of the Gordon mill in March, 1943. The ore from this operation will go to the Central mill of Eagle-Picher Mining and Smelting Company for treatment.

H. G. Weidman, of Baxter Springs, who is manager of the Dines Mining Company, reports that mine operations will continue from the old Brownhead shaft on the Tar Creek forty. The ore will be trucked to the new Blue Mound mill of the Dines Company, north of Picher. The Tar Creek property is located about a mile northwest of Treece.

Kropp Land Mine to Be Reopened

It is reported that A. A. Childress, of Joplin, operator of the Southern Mining Company property located just northwest of Treece, has recently obtained a lease on 240 acres of Kropp land a mile and a half north of Quapaw. Preparations are now well under way there for the opening of three shafts. It is also reported that derricks and 350-ton hoppers will be built at each of the shafts as they are reopened and that electric hoists will be installed. Mining operations will be conducted at about the 220-ft. level at all three shafts. A Sullivan air-compressor, driven by a 165 hp. Bessemer gas engine will be moved from the Southern Mining Company's property to furnish air for the underground operation. The ore rock from the three shafts will be trucked to the custom mill of the Mission Mining and Royalty Company, which is located on an adjoining forty.

Calumet and Hecla Making Progress at Allouez

The sinking of Allouez No. 3 shaft, located north of Calumet, Mich., by the Calumet & Hecla Consolidated Copper Company, is reported to have reached a depth of something over 1,000 ft. It is also reported that a drift on the 8th level of the mine is now well advanced and that stoping of copper ore has commenced. Sinking operations of the 2-compartment Allouez No. 3 started in February, 1943. Since that time there has also been development work on the 400-ft. level advancing into a conglomerate ore body and two amygdaloid lodes. Mineralization was indicated by diamond drilling records and current development work is being conducted to check mineralized horizons for commercial orebodies. Calumet & Hecla is currently conducting an important campaign to discover new copper sources in northern Michigan.

Mining Subsidiary Adopts Alcoa Name

The Republic Mining and Manufacturing Company has changed its name to Alcoa Mining Company, effective April 15, according to Frank B. Cuff, president.

The Republic name is being replaced in order to identify it more closely with Aluminum Company of America, of which it has been a 100 percent subsidiary since 1909. Incorporated in 1882, it was the first concern to mine bauxite in the U. S. and has been largely responsible for the development of the nation's principal deposits, in Arkansas, which it has mined since 1899.

During World War II it has been producing at a rate 15 times that of 1939, in order to help meet the vastly increased needs of aluminum for aircraft and other military applications. It also provides bauxite to the chemical, abrasive and refractory industries, and carries on operations in Georgia and Alabama, in addition to Arkansas.

Interlake Navigation Opens

The freighter *Sir Thos. Shaughnessy*, arrived at Duluth-Superior harbor March 28 with a cargo of barley from Fort William, Ontario. With the freighter *Capt. C. D. Secord* (both of the Mohawk Navigation Co., Montreal, Canada), the *Shaughnessy* officially opened interlake navigation during the last week of March. These ships passed westward through the Sault Ste. Marie, Ontario, locks on March 26, en route to Fort William.

The arrival of iron ore vessels awaited only the time for insurance protection to go into effect, scheduled for April 1. Earliest previous opening of the Duluth ship canal was March 26, 1942, with arrival of the steamer *W. G. Mather*. The *Cadillac* was first last year, on April 9.

All of the American iron ranges of the Lake Superior district began loading railroad cars direct from shaft during the last week of March. With the demand for ore again heavy, everything possible is being done to expedite full capacity ore shipments.

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Above is a Sauerman Scraper machine with 10 cu. yd. bucket handling a 200,000-ton stockpile on a semi-circular area 400 ft. in radius. Machine's capacity is 400 tons hourly, either storing or reclaiming.

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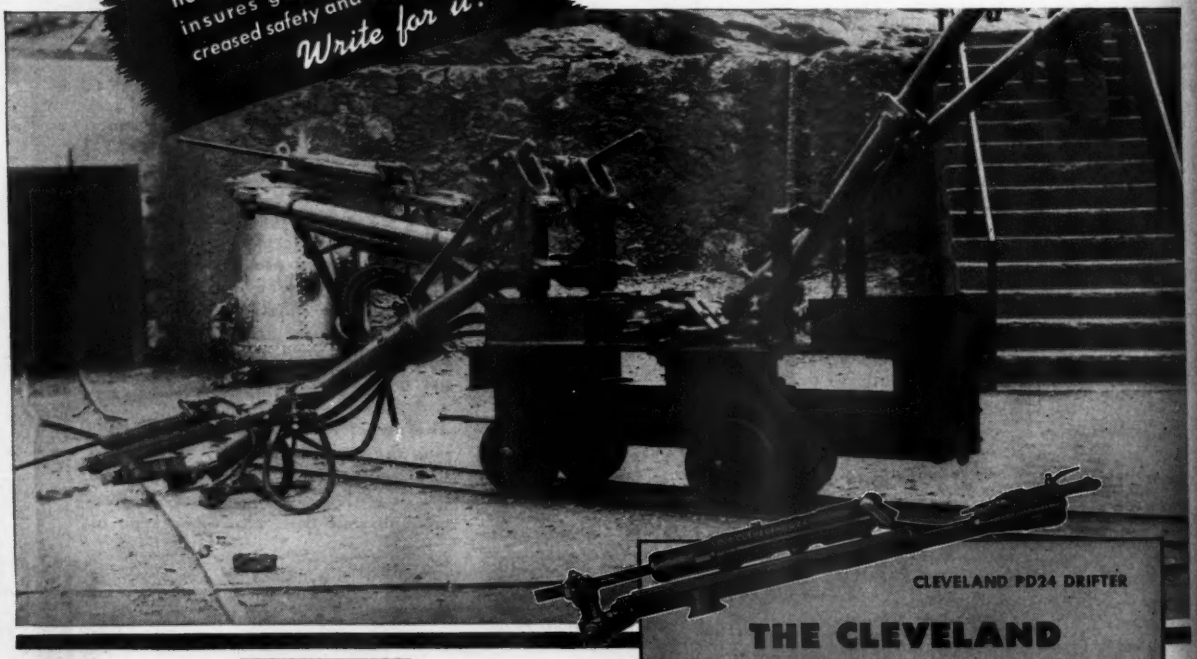
Using the Jumbo in a 600 meter length, 9' x 8' haulage drift, *they averaged over 30 meters lineal advance per week.* This is believed to be the best record ever made on a tunnel job in Mexico. Both Mr. C. H. Bush, Superintendent, and Mr. G. S. McKay, General Manager, are loud in their praises of the Jumbo and the Cleveland PD24 Drifters used on it.

Bulletin 131A tells exactly how this remarkable mine rig insures greater footage, increased safety and easier work. *Write for it!*



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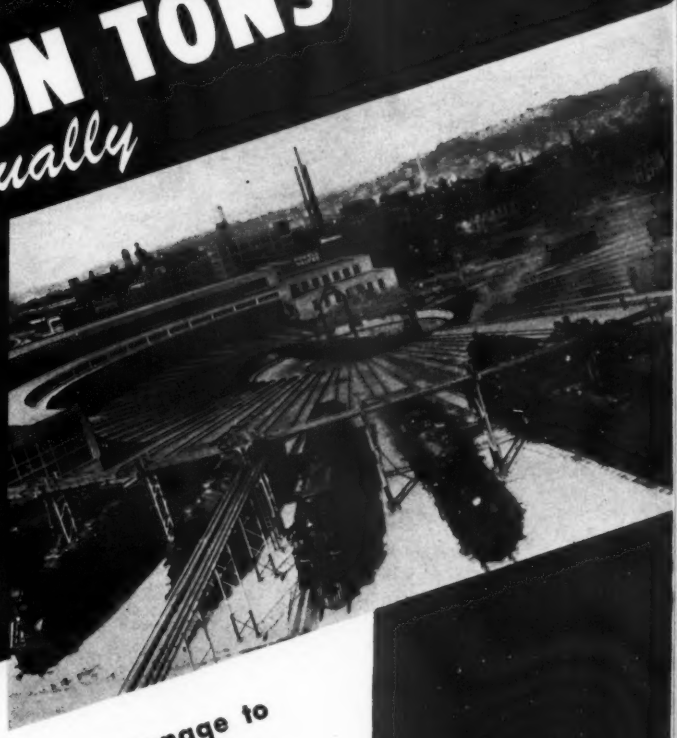

The railroads require this huge tonnage to keep vital war materials moving to the front—to serve industry—to move troops and civilians on important missions.

Jeffrey mining machinery—loaders, drills, cutters, underground conveyors, locomotives, sizing and cleaning equipment—has a definite place in the production of coal for railroad consumption. Our engineers realize that considerable responsibility falls upon these units—they build accordingly.

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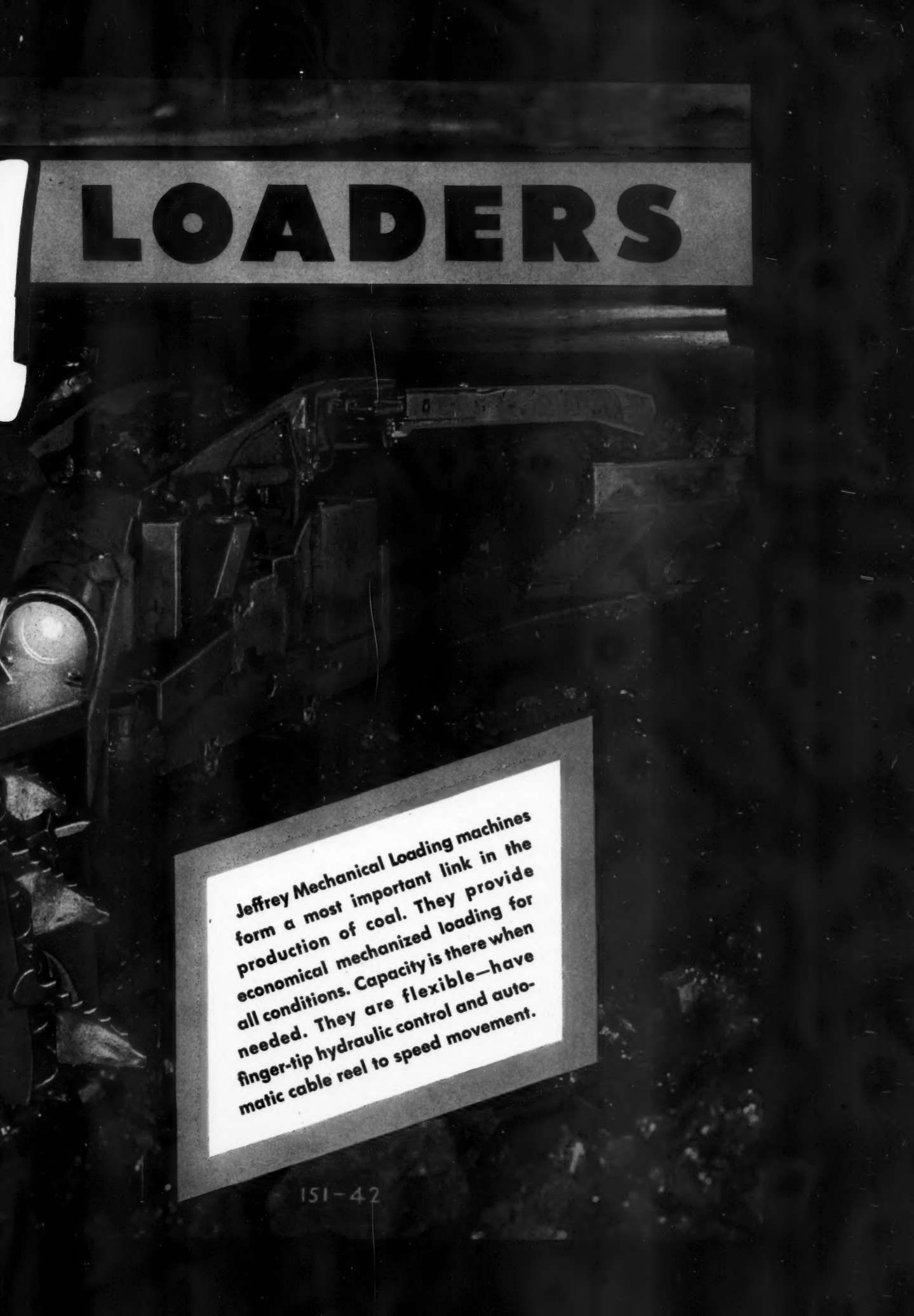
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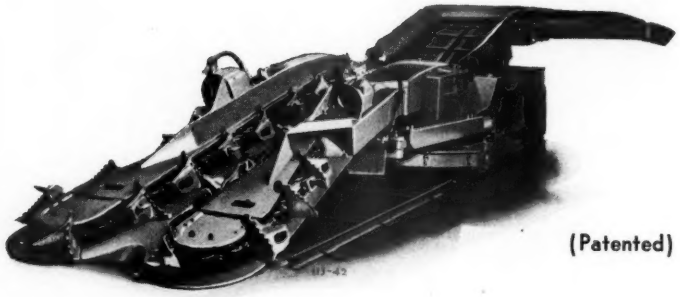

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Jeffrey L-600 Loader for mines with unrestricted height

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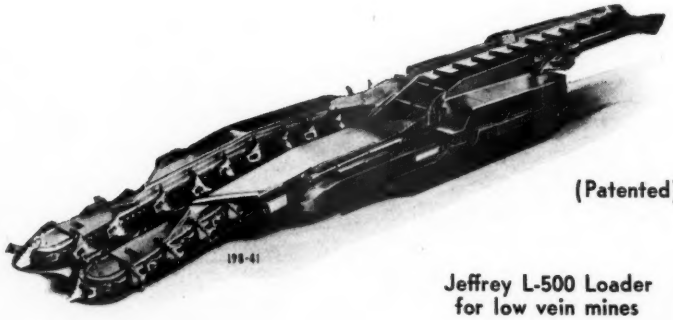

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Jeffrey L-500 Loader for low vein mines

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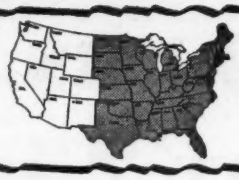


Push Operation of Brown Derby Mine

COLO.

The Hayden Mining Company, which is sponsored by Robert Wilfley and Edward Chapman, is reported to be mining a mixed ore of lepidolite (lithium) and microlite (tantalum) at the Brown Derby mine north of Gunnison, Colo. Ore is said to be trucked over the Divide to a small new mill at Brown's Canyon near Salida.

This new mill uses the new Humphreys spiral concentrator in separating the minerals and it is reported that there are no tailings in the operation. The operators anticipate a continuing demand for lithium because of the number of new processes in which it is being used. These, developed during the war, may enjoy a much larger postwar use.

Tintic Standard Operations

UTAH

Net loss of the Tintic Standard Mining Company amounted to $95,194.57 in 1944, according to the annual report of the company just mailed to stockholders.

Net loss from mining operations amounted to $195,225.64, while income from other sources amounted to $149,447.78, which after deducting general administrative and other expenses left a net loss of $95,194.57.

James W. Wade, president and general manager in his report states:

The Tintic Standard produced 28,145 tons, 29,560 tons less than in 1943. The quantities of metals contained in ores shipped from the Tintic Standard mines, and the values thereof were as follows: lead, 4,777,264 lb., value $310,522.09; silver, 319,597 oz., value $225,715.37; gold, 1,375 oz., value $48,002.32; and copper, 210,960 lb., value $22,042.10. Mill dump tailings were sold for $46,727.32.

Dividends paid during the year totaled $85,508.48, equal to 7½ cents per share. All dividends paid during the year are taxable to recipients for federal income tax purposes, but are not taxable for Utah state income tax purposes.

Cougar Mine

The construction of the mill was completed and the 200-level tunnel was completed and connected by a raise to the Bureau of Mines tunnel, and the mine placed in operation.

At this mine, the operating crew is less than that necessary to reach the output planned, and diligent work is being carried on through the United States Employment Service to get the new men we need.

The mill has operated on a reduced tonnage, but has demonstrated it will produce a metallurgical grade fluorspar that will meet all the requirements of the Metals Reserve Company, the buyers of our output. It is hoped that a crew can be built up to our requirements, and our efforts will continue along that line. The mine produced 1,509 tons of concentrates of metallurgical grade fluorspar. Average fluorspar content is shown in statistical tables in this report.

Eureka Lilly Consolidated Mining Company

Reference is made to the statistical tables and audited statements herein.

The production of ore was by leasers, the same as last year, and the net profit for the year was $9,092.41.

North Lily-Tintic Standard Development Unit

The statistical tables give information on the ore shipped from the Twentieth Century Mining Company's portion of this Unit. In December, all work was suspended in this Unit owing to lack of men.

Colorado Consolidated Mines Company

Audited statements and statistical tables are included in this report. All production from this mine was by leasers working adjacent to the No. 4 shaft and the No. 1 shaft.

New Park Mining Company

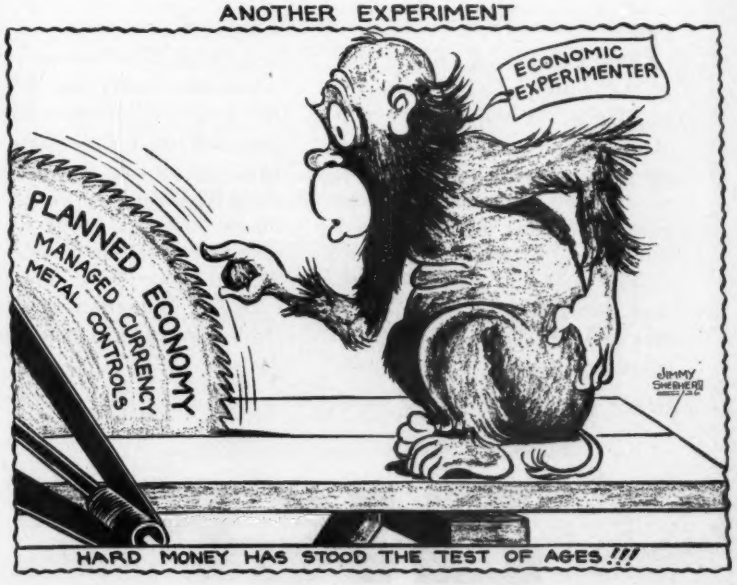
During the year 69,700 shares were sold for $44,457.75, leaving 278,400 shares as our investment in this stock at the close of the year.

North Butte in 1944

MONT.

President Paul A. Gow, of the North Butte Mining Co., recently reported that: Development and mining ore in the Granite Mountain mine was conducted throughout the year under contract with Anaconda Mining Company, through the Badger State shaft. Work was confined to the area south of the Granite Mountain shaft on the Edith May vein and various hanging wall and foot wall splits thereof and on the various levels from the 2,800 to the 3,800 ft. levels.

During the year there were mined 130,113 dry tons of ore of an average grade of 3.515 percent copper from which together with precipitates from mine waters there were produced 8,674,353 lb. of recoverable copper, 177,468 oz. of gold and 203,256 oz. of silver having a gross value of $1,968,203.02 and resulting in net returns



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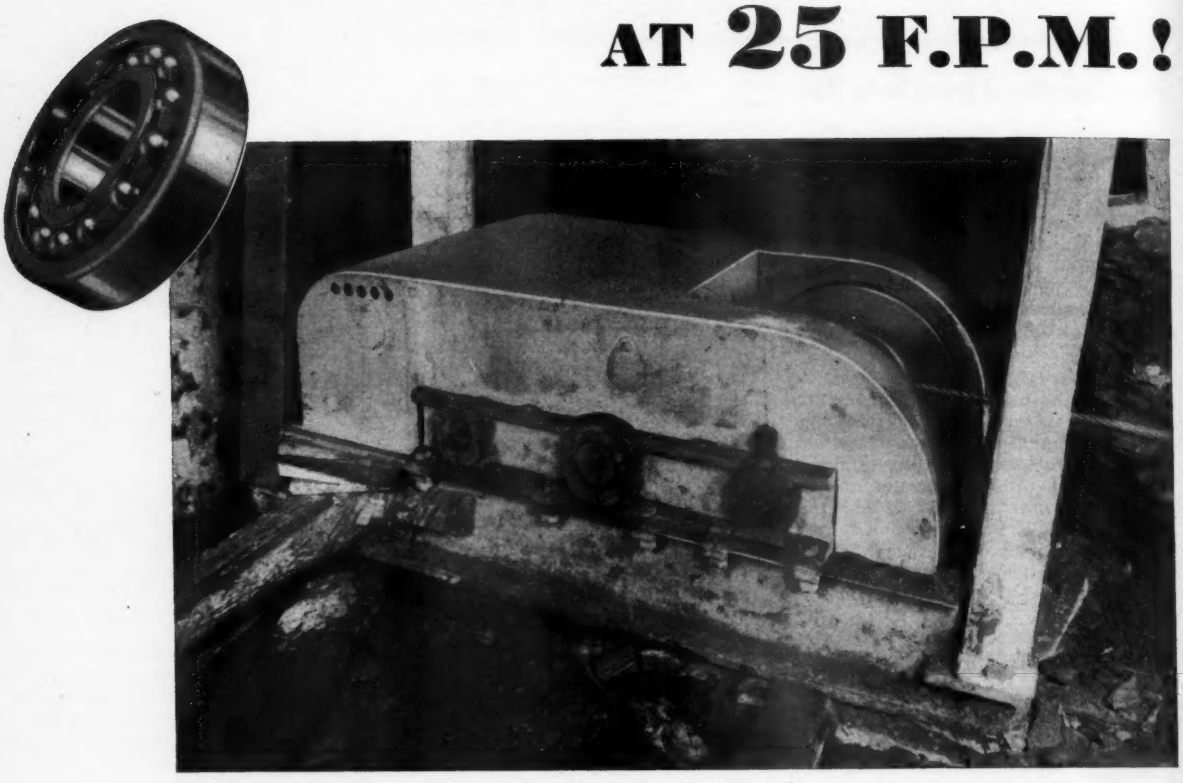

Built by VULCAN IRON WORKS

There's plenty of pull in this SKF-equipped 5 h.p. Car Spotting Hoist. It helps spot a trip of cars at the discharge end of the conveyor and hoists or lowers the trip past the discharge point at a time and at a speed conducive to uniform and continuous loading. SKF Bearings are on the pedestals where they easily take the loads imposed by a rope pull of 6000 pounds at 25 feet per minute . . . where they carry the weight of the drum with its 600 feet of 5/8" rope. What makes them ideal bearings for this application is their high capacity . . . their inherent aligning properties that compensate for shaft deflections, distortions or weave. The way to increase production on any machine is to trust its vital rotating parts to SKF's. 5738

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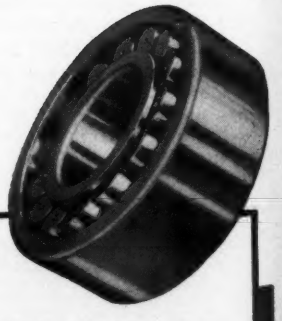

Pioneering in practically all industries, SKF produces ball and roller bearings of all types and sizes, from ⅛" to 59" O.D.

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SKF
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to North Butte Mining Company of $351,403.14.

Development work done amounted to 9,261 ft. of level development which consisted of 2,899 ft. of crosscuts, 5,339 ft. of drifts, and 1,023 ft. of laterals and 4,740 ft. of raises. Level development work is being carried on currently at the rate of about 600 ft. per month.

The entire Granite Mountain operation, both mining and development, is being carried on with less than 22 percent of the mining labor required for full operation.

Drilling at Silver King

A drilling program has been started in the famous old Silver King mine near Superior, a property whose history dates back to 1873, and which has been worked only on a small scale since 1920.

Sprague and Henwood, Inc., Scranton, Pa., will operate under bond and lease from Bat Gays, who has held the property since 1920 as Silver King Mines, Inc. Drilling has commenced at the 800-foot level, the depth to which the mine was previously worked.

The Silver King is said to have been located by a soldier of the U. S. cavalry sent into the district to halt Apache Indian raids, who was killed by the Indians before he could develop his finds. Two years later, in 1875, the property was located on record by Charles G. Mason, Benjamin W. Reagan, William Long, and Isaac Copeland. This group was reported to have taken $50,000 in ore from the 42-foot shaft and a 12-foot drift driven on the site of the mine within a few weeks. Sold to the Silver King company of San Francisco, the mine was operated profitably until 1887; and from 1888 to 1896, irregularly. The mine was sold to Arizona owners in 1916. It was reorganized by Bat Gays in 1920.

Astonished-Fairview Produces

Fifty tons of ore per month, said to assay seven percent copper, are being shipped by Russell Haddy from the Astonished-Fairview group of claims, located west of Miami on the Superior highway. The development is said to have been made possible through a Reconstruction Finance Corporation loan.

Juno Lead-Zinc

Out of operation since 1908, the Juno lead-zinc mine of the Cerbat range near Chloride, Mohave county, is reported to be making a valuable contribution to the war effort. For the past several months, between 200 and 250 tons of ore monthly has been shipped to a smelter in Midvale, Utah. The mine now is operated by J. H. Beauchamp, who took it over two years ago.

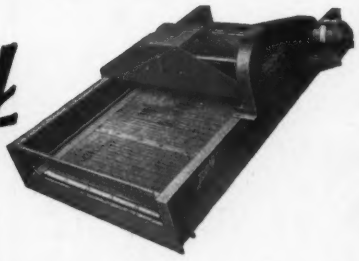
12-Ft. Vein at Golden Door

Development operations at the Golden Door gold mine northwest of Chloride in Mohave county has uncovered a 12-foot ore vein which assays at $20 a ton, it is reported by Kean St. Charles. Low grade ore on the property also has been blocked out. The mine, a heavy producer of the past, was operated prior to the war by Dye and Bathrick.

Seek New Road for Asbestos Ore

Heavy snow which in March halted the trucking of asbestos ore from the Pierce and Triangle claims and the Sloan group north of Globe have prompted operators to seek an all-

THE Leahy HEAVY DUTY



No-Blind Vibrating Screen
For
HIGHER PRODUCTION and EFFICIENCY
At LOWER COST

Note these features which contribute to the Leahy Heavy Duty Vibrating Screen's ability to maintain a high screening efficiency while attaining maximum production at lower maintenance costs:

1. The vibration is DIFFERENTIAL so that the functions of stratifying, unblinding and screening are each accomplished by the most efficient vibratory motion for greatest production.
2. This vibration, positively governed by a tool steel, heat-treated cam, is transmitted to the screen cloth at three strategic points so that every square inch is ALIVE with this efficient differential vibration.
3. Since only the screen jacket does the work, it alone is vibrated and the power requirement is extremely low—about ½ H.P. under full load operation.
4. Maintenance is very economical due to simple, rugged construction—field facts show that yearly upkeep is less than 1% of the original investment.

Complete details of these and many other money-saving features are explained in Bulletin 14-H. Send for it today.

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COVCENCO PRODUCTS

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winter route from the mines from Cherry Creek by way of Sombrero Butte to shipping points. The proposed new route also would trim hauling distance from 110 to 70 miles, it was said.

Federal Loans for Gold Mines

Arizona small miners have been urged by George Ballam, of the state mineral resources department, to file early applications for federal loans to rehabilitate gold properties for operation following the war. Ballam told miners in Tombstone that 750 Arizona gold mines were closed in 1942, and all of them will need postwar financing. A flood of applications for loans is anticipated with the close of European hostilities, and early filing is practicable, Ballam said.

Federal First Quarter Dividends

A dividend of 75 cents a share for the first quarter of 1945 has been declared by the Federal Mining & Smelting company, payable March 20 to stock of record March 1. The current disbursement totals $184,980 and brings the company's total dividend record to $30,425,860. The Page mine at Kellogg is now the company's largest producing property in the Coeur d'Arlene district as a result of a recent discovery of a major sized ore body on the deep levels. The Morning mine at Mullan, formerly the largest producer, has been practically closed during the year 1944 because of labor shortage. The Morning mill, however, has continued to operate on low grade feed from the mine dumps and on ore from the company's Frisco mine at Gem.

H & H Sink and Float Adopted

The H & H sink-and-float mineral separation process has been adopted and installed by the Hecla, Sullivan and Bunker Hill Mining companies and is now being recommended for smaller mining operations, according to H. W. Halton, metallurgical engineer for the Sink & Float corporation, with headquarters in Wallace, who installed the first sink-and-float plant in this district at the Sullivan company's Star mill at Burke. The process is a cheap installation for small mines, says Halton, and can be applied to old mine dumps and tailings deposits at reasonable cost.

Save Zinc Values

Leasers operating the Gold Hunter mine at Mullan have installed a Fahrenwald type zinc flotation unit in the 500-ton Hunter milling plant in an effort to save low zinc values which have formerly gone to waste. The leasers are operating on a mill feed below the average in this district but the resulting concentrate product is a high grade lead-silver ore. No previous attempt has ever been made to save the zinc values.

Idaho Manpower

Idaho State Mine Inspector Arthur Campbell has issued his annual report for the mining industry of Idaho for 1944, in which he says 4,600 men and women were employed in the Idaho mining industry during the year, including underground and surface employes. About 200 more men were engaged in getting out timber for the mines. Women were employed in the industry for the first time in history, he states. The first experiment of this kind was at the Hecla sorting plant and was so satisfactory that the practice has extended to other companies, where women are employed in surface jobs. The Bunker Hill company uses a large number in all departments at the Bunker Hill smelter.

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PURE

New Hoist Installed

The Lucky Friday Silver-Lead Mining Company has completed installation of a new 200-horsepower electric hoist purchased from the Coeur d'Alene Hardware and Foundry Company and now has the machine in use in sinking operations from the 800 to the 1,000-ft. level. This month the company shipped 2,500 tons of ore to the Golconda mill which carried 11 oz. in silver in addition to lead and zinc values.

Rip Van Winkle Consolidated Operates at Near Capacity

The lead-zinc properties of the Rip Van Winkle Consolidated Mining Company in the Lone Mountain district of Elko County, Nev., are being operated at near capacity. George B. Thatcher, of Reno, Nev., is head of the company. It is reported, however, that manpower shortage is preventing full capacity production from the property. During the last two years, development work of the Rip Van Winkle property is said to have proved continuation of the main ore body in the lower level of the mine. Fred M. Foster, of Elko, is general superintendent of these operations.

Rich Ore Shipped by Tonopah Lessees

The Brown and Bombassei lease on the Tonopah Mining Company's property at Mizpah Hill recently shipped some very rich ore over the Tonopah and Goldfield Railroad. The shipment was consigned to a Utah smelter and filled a standard 50-ton railroad car. The ore was reported to average about $135 a ton with values of 121 oz. of silver and 1.4 oz. of gold. The leasers are said to have broken the ore from a vein on the 400-ft. level of the Silver Top side of the Mizpah property, according to a reported statement of Manager Horace Johnson. The lessees are said to be still working in similar grade ore and are accumulating more rich material for another shipment.

Noonday to Ship Copper

The recently opened Noonday mine, four miles southeast of Eldorado, Calif., is expected to begin shipments of copper ore shortly. According to manager L. C. Baldwin, approximately 20,000 tons of ore, assaying five percent copper and containing gold and silver values, is in sight. The underground workings include a two-compartment shaft 200 ft. deep and several feet of workings on the 100 and 200-ft. levels. The Noonday mine was in operation some 70 years ago and is today held under lease by S. T. Hilberg.

Tungstar Discovers Promising Orebody

A body of promising commercial grade tungsten ore of unknown extent has been revealed at the property of the Tungstar Corporation. It is reported that the vein which the company had been working terminated in a rock formation and then the new deposit was discovered by shaft sinking through this rock formation at a distance of two ft. from the old vein. The prospect opening is now said to extend for a distance of about 20 ft. It is expected that operations will be continued throughout the winter. The Tungstar Corporation has been producing about 100 units of WO_3 per day at its Bishop, Calif, property, treating a total of about 75 tons of ore daily in its table concentration and flotation plant. A crew of 88 men is employed.

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MANUFACTURERS FORUM

New Process Said to Give Longer Life to Flax Packings

Announcement is made of a newly developed flax packing made by a process which is reported to keep the flax soft and pliable for long periods.

In introducing this new product, Palmetto Square Flax Packing, Greene, Tweed & Company have aimed to overcome the past tendency of flax packing to harden prematurely. This tendency has been ascribed to the custom of plaiting the flax while dry, and relying on immersion of the finished packing in hot tallow to provide sufficient lubrication.

The manufacturer has reversed the customary procedure of lubricating flax packing. Each individual strand of the flax roving is thoroughly lubricated before the strands are processed into packing. Each strand is put through a machine which forces hot tallow into the innermost structure of the flax. Then the thoroughly impregnated strands are plaited into packing form.

Thus a uniform, balanced amount of lubricant is provided throughout the packing—in other words, complete internal lubrication. This, the manufacturers claim, results in lowest possible stuffing box friction and minimum wear on shafts, rods, stems, etc.

This new packing is now available in two types—the regular tallow-impregnated packing and a graphite-coated type, sometimes referred to as waterproof hydraulic flax.

Operators of reciprocating equipment, hydraulic presses, rams, and all high pressure hydraulic machines, for which flax packing is recognized as being especially suited, may secure full information about this new type packing by applying to Greene, Tweed & Co., Bronx Boulevard at 238th Street, New York 66, N. Y.

New Flame-Proof Paint

According to a report from the Wilbur & Williams Company, Boston, Mass., a brilliant, metallic, flame-proof coating for application to surfaces subjected to very high temperatures, and for all surfaces, hot or cold where a non-inflammable coating is needed as a fire-retardant, and which may be applied directly to glowing metal without flame hazard has been provided in its Blaze-Pruf Silver Lume for which the company claims the following properties:

(1) Unaffected by temperatures up to 1,800° F.

(2) Non-inflammable on direct blow-torch tests.

(3) For interior or exterior uses.

(4) Retains its brightness and lustre after exposure to high temperatures.

(5) Metallic pigment fuses at about 400° F.

(6) Applied to either hot or cold surfaces.

(7) Penetrates rusted and pitted surfaces to form a seal against corrosive action.

(8) Fire-retardant coating for wood and other surfaces.

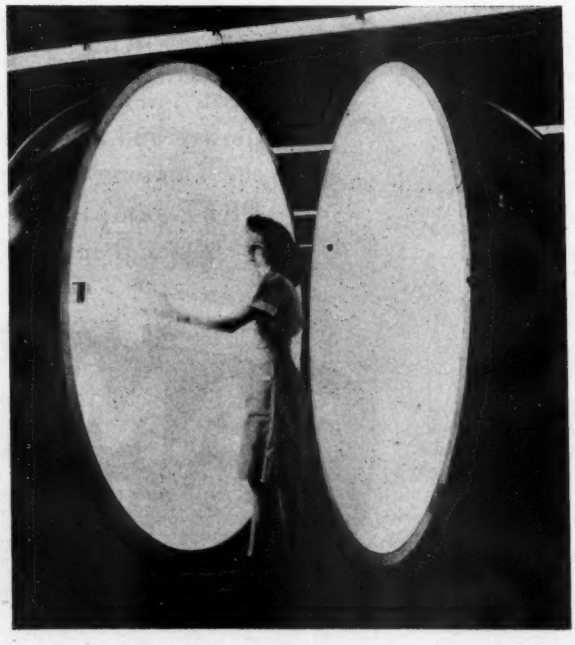
Blaze-Pruf Silver-Lume is said to afford fire-retarding protection when applied to wood, masonry or metal surfaces in dangerous locations, particularly aboard ship and in laboratories or confined spaces where an inflammable coating would encourage the rapid spread of fire. Blaze-Pruf is also available in white and other non-metallic finishes.

New Fluorescent Life Ratings Announced

New and longer life ratings for the 6, 8, 15, 20 and 30-watt Westinghouse white and daylight fluorescent lamps have been announced:

Lamp	Burning hours per start	Rated average life* (hours)	Approx. % of initial lumens per watt at 70% of rated life
6-watt F	..	1,500	75
8-watt F	..	1,500	75
15-watt F (T8)	3	2,500	78
	6	4,000	72
	12	6,000	69
15-watt F (T12)	3	2,500	84
	6	4,000	76
	12	6,000	70
20-watt F	3	2,500	84
	6	4,000	76
	12	6,000	70
30-watt F	3	2,500	78
	6	4,000	72
	12	6,000	69

* Life under specified test conditions. This includes such factors as operation on AC circuits at rated voltage, the use of starters and ballasts, or transformers of proper design.

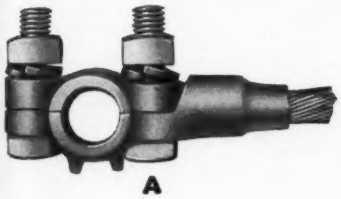


This 7-ft. sphere at Westinghouse fluorescent lamp plant, Fairmont, W. Va., is used to test lamp tubes. Operator is placing 100-watt tube for testing. With sphere closed, lamp's radiation will be measured through a tiny hole in the sphere's side

New Voltage Booster

The Mosebach Electric and Supply Company, 1152 Arlington Avenue, Pittsburgh 3, Pa., announces a new Mesco Voltage Booster for maintaining maximum voltage at the face.

The assembly, as illustrated, consists of (A) a bronze bolt-type feeder clamp and (B) a bronze trolley clamp which are connected by a flash-welded 4/0 flexible strand copper cable. The



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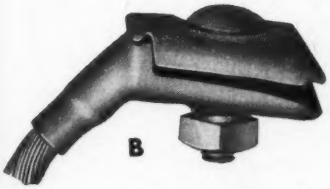

B

booster is hooked on to the feeder line with the clamp, securely held by two bolts, in order to equalize the voltage between the feeder and the trolley line. By employing this method it is reported to be possible to maintain maximum voltage at the face, so necessary in mechanized mining.

Mesco Voltage Boosters, which are patented, can be furnished with connections for any size feeder and trolley wire. Complete information and prices will be furnished on request.

New Self-Locking Pins

The Driv-Lok Pin Company, 565 West Washington Blvd., Chicago, announces a complete line of standard and special self-anchoring, vibration-proof pins, which are designed to replace more expensive taper pins, keys, cotter pins, set screws, rivets, etc. These pins, which are pressed or driven into standard drilled holes, have four flutes on the surface parallel to the axis. The length and position of the flute can be controlled accurately, so that fully or partially grooved pins are available. Fully grooved pins have a pilot at one end so that the pin can be easily inserted.

The raised, work-hardened edges of these flutes provide an expanded diameter of a few (specified) thousandths greater than the nominal diameter of the pin. When the pin is inserted in a drilled hole, these raised edges are compressed inwardly, providing a resilient, self-locking element which, it is claimed, will hold indefinitely under vibration or shock conditions. They are available in sizes from 3/64" to ½" diameter, and from 3/16" to 4½" in length, in any material, and in a wide variety of types.

Widely used in the automotive industry, these new pins are now available in a broad category of sizes, types, materials, and special designs to meet all types of industrial applications, providing, it is claimed, large possibilities for cost savings in initial and total labor assembly costs.

New "Powder-Metallurgy" Pump Seal

The Keystone Carbon Company, St. Marys, Pa., are now applying powder metallurgy methods in the manufacture of seals for airplane fuel pumps, as well as parts of intricate design, through compression molding using a wide variety of powdered metals, according to an announcement by M. T. Victor of the Powder Metal Parts Division of the company.

The low-cost advantages of powder metallurgy over conventional methods are reportedly illustrated in this application. Through compression molding of bronze powder it is said to be possible to manufacture the seal for about one-tenth the former cost of production which involved casting, machining, milling, drilling, and slotting operations. In addition, it is reported that the manufacturer was able to maintain closer tolerances and production was stepped up appreciably.

New Dual-Duty Mine Locomotives

Eight-ton dual duty explosion-tested mine locomotives, said to be the first ever developed, have been purchased by a large coal company. Developed and introduced by the Westinghouse Electric and Manufacturing Company to fill the need for a suitable locomotive for mechanized mines, these two-speed locomotives are designed to perform both gathering and swing operations.

The usual low speed is for gathering when the locomotive is operating behind the loading machine. For this service, the motors operate at greater field strength to develop maximum tractive effort at low speed and with minimum power usage.

The new second speed is for swing service when operating on secondary haulage. For this service the motor fields may be weakened to obtain an increase in speed of approximately 40 percent, enabling longer movements at an economical speed.

Announcements

Davey Compressor Company, of Kent, Ohio, announces the appointment of three new dealers to handle the Davey line. Wallace R. McKinney, Jr., 154 South Franklin Street, Mobile, Ala., will handle sales and service in southern counties of Alabama and in West Florida counties around Pensacola. Murray Machinery Company, Sales Division, Inc., 169 State Street, Augusta, Me., will cover the states of Maine and New Hampshire. Ohio Muf-L-Cote Company, 71 South Broadway, Akron, Ohio, will handle the Akron-Canton-Massillon areas.

* * *

The New York district sales offices of **Atlas Powder Company's** explosives department were moved to the Lincoln Building, 60 East 42nd Street, New York City, on March 27, 1945. During alterations the offices will be located on the 28th floor of the Lincoln Building, but later the offices will occupy the 52nd floor.

* * *

Evercrete Corporation, New York City, manufacturers of protective and decorative coatings for masonry surfaces, announces as of May 1, 1945, their Headquarters at 424 West 42nd Street, to be known as The Evercrete Building.

It is stated that at these premises they will conduct a free technical service for the benefit of the public, offering free advice and suggestions relative to masonry problems.

They have found, due to war-time building restrictions, the protection of masonry surfaces a MUST and one which works right in with national defense.

Any organization or individual who wishes free advice pertaining to masonry problems, may obtain same by writing Technical Dept., Evercrete Corporation, New York 18, N. Y.

* * *

The Approved Quality Control Rating, award of the Army Air Forces Air Technical Service Command for meritorious industrial achievement, has been granted **The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.**, according to notification received by the Passaic, N. J., plant from 1st Lt. Norman S. Gilbert, Regional Public Relations Officer of the New York region, of the Air Technical Service Command.

"The rating denotes," the letter reads, "that each department of the contractor's plant and each inspection operation therein is properly organized and controlled and that the contractor has established an inspection system which meets with the approval of the AAF."

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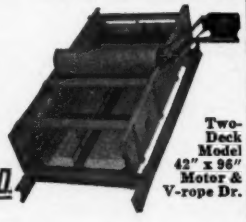

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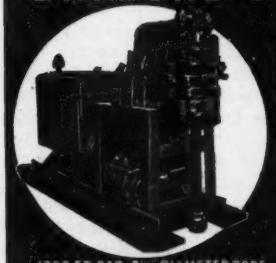

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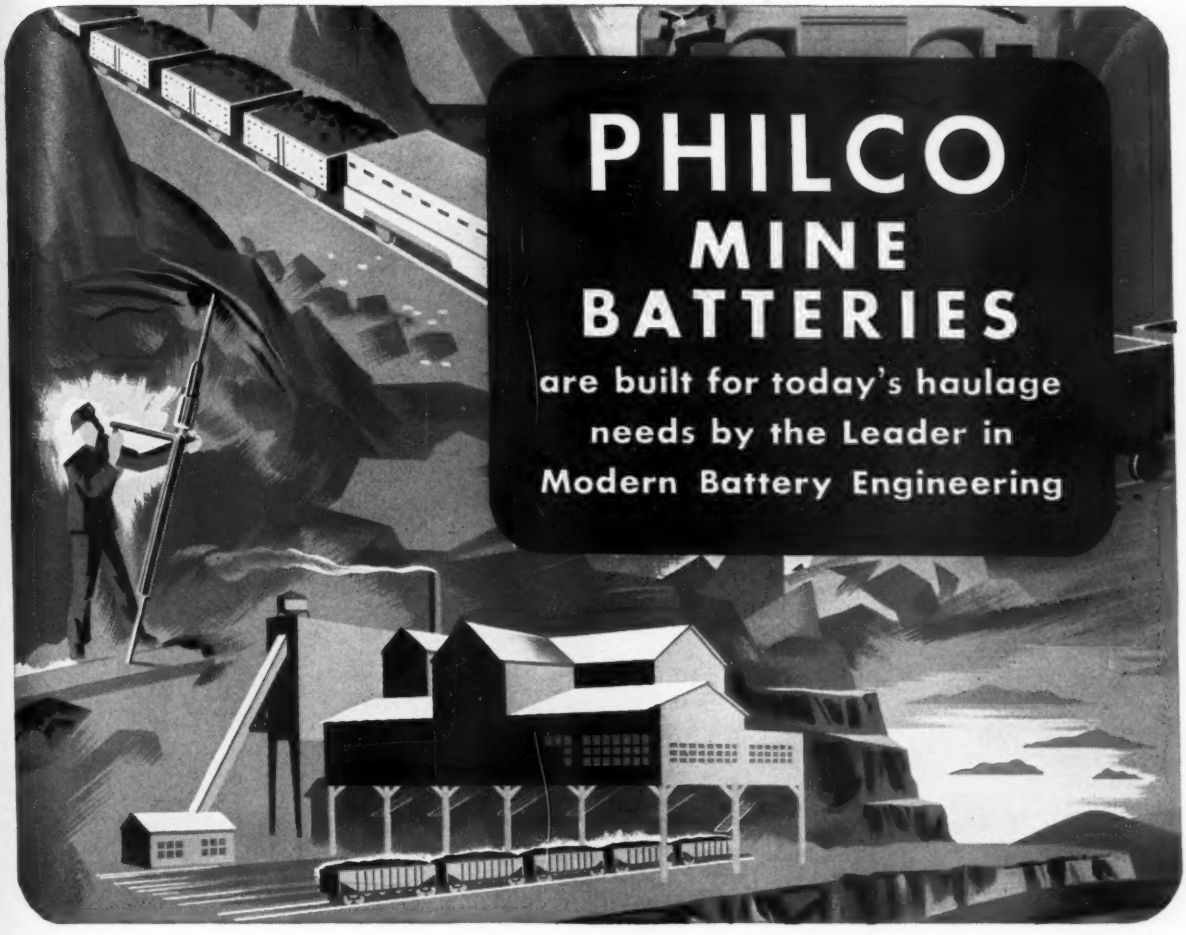
Gardner-Denver Co.	4
General Electric Co.	30-31
Goodman Mfg. Co.	20-21
Gruendler Crusher & Pulverizer Co.	90
Hercules Powder Co., Inc.	16
Hoffman Bros. Drilling Co.	104
Independent Pneumatic Tool Co.	80
I-T-E Circuit Breaker Co.	90
Jeffrey Mfg. Co.	Insert between 96-97
Joy Mfg. Co.	12-13
Kennametal, Inc.	88
Koehler Mfg. Co.	86
Koppers Co. (Wood Preserving Division)	5
Link-Belt Co.	28
Loftus, Peter F.	85
Mack Trucks, Inc.	22
Macwhyte Company	91
Marion Steam Shovel Co., The	19
Mine Safety Appliances Co.	Back Cover
Morrow Mfg. Co.	25
Mott Core Drilling Co.	104
Myers-Whaley Co.	33
Ohio Brass Co.	75
Paulick, P. R.	91
Pennsylvania Drilling Co.	104
Philco Corp. (Storage Battery Division)	Third Cover
Phillips Mine & Mill Supply Co.	18
Pure Oil Co., The	100
Roberts & Schaefer Co.	34
Robinson Ventilating Co.	104
Sauerman Bros., Inc.	95
SKF Industries, Inc.	98
Sullivan Machinery Co.	26-27
Tamping Bag Co.	101
Templeton, Kenly & Co.	29
United States Rubber Co.	14-15-92
Universal Vibrating Screen Co.	104
Westinghouse Elec. & Mfg. Co.	Second Cover, 6-7
Young, L. E.	85



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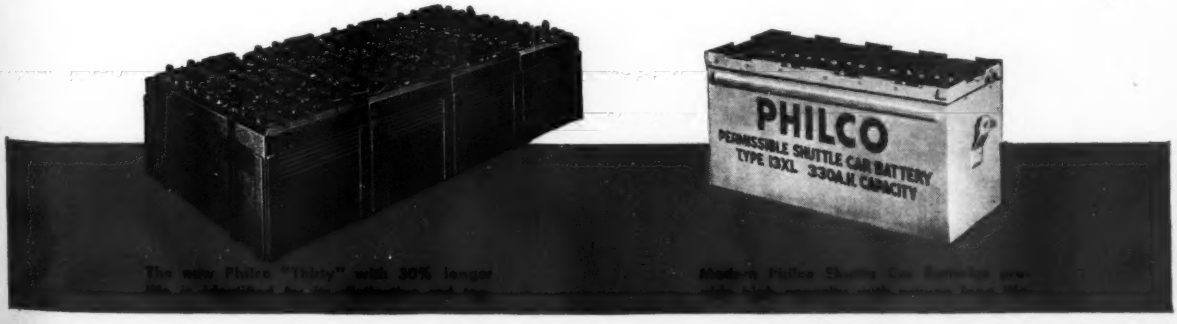

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